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Consensus on Terminology for Describing Child Language Interventions: A Delphi Study

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Abstract

Purpose: Language intervention for children with language disorder may be effective; however, lack of detailed and consistent terminology for describing language interventions poses barriers for advancement within the field. This study aimed to develop consensus from speech language pathologist (SLP)s in Australia on a taxonomy with terminology for describing language interventions for school-aged children and investigate SLP's application of taxonomy terminology when describing child language interventions.

Method: A taxonomy with terms for describing interventions was developed with reference to contemporary literature and presented to clinicians and researchers with expertise in child language disorders in a three round Delphi study. We asked Delphi participants to indicate agreement with the taxonomy or propose changes. Application of the taxonomy was investigated by asking participants to use taxonomy terminology to describe interventions presented in two case studies.

Results: The taxonomy consists of five aspects across which interventions may be described: modality/domain, purpose, delivery, form, and teaching techniques. Consensus on the taxonomy was established in both round one (55 participants) and round two (43 participants), with 100% of SLPs strongly agreeing or agreeing with the overall structure of the taxonomy and at least 87.3% of SLPs strongly agreeing or agreeing with each aspect. In round three (32 participants), consensus was reached on 45/54 taxonomy categories (4/12 of the components) for case study one and 45/54 taxonomy categories (7/12 of the components) for case study two.

Conclusion: Consensus on a taxonomy with terminology for describing language interventions represents a significant advancement in the field of child language intervention. Future actions may be needed to facilitate consistent application of taxonomy terms.

Introduction

Language interventions provided by speech-language pathologist (SLP)s have been shown to have positive outcomes for children with language disorders (Cirrin & Gillam, 2008; Law et al., 2003). However, lack of consistent and detailed terminology for describing the specific nature of language interventions has been identified as a significant barrier for advancing knowledge in both clinical practice and research (Law et al., 2008; Roulstone, 2015). SLPs learn terms for describing language intervention via multiple avenues including university training, textbooks, professional literature, continuing professional development opportunities, workplaces, and discussions with peers. As there is no agreed-upon terminology, terminology use may vary depending on where SLPs were trained, where they work or the professional development they have accessed. As a result, variability exists in terminology use (Roulstone, 2015). The same term may be used with varied interpretations or multiple terms may be used refer to a single concept (Cowie et al., 2001).

Ambiguous use of terminology impacts upon the detail with which language interventions are described by SLPs. Authors in the field have repeatedly raised the issue of language interventions being described by general approach or materials used rather than by the specific tasks and techniques embedded in interventions (Law et al., 2008; McCauley et al., 2017; Roulstone, 2015). This was observed in previous studies in the United Kingdom investigating the types of language interventions used with children (Lindsay et al., 2010; Roulstone et al., 2015). In the study by Lindsay et al. (2010), staff from SLP and educational psychology services were asked in interviews to describe the interventions they use. A total of 158 different interventions were identified which the researchers categorized as: published programmes, intervention activities (e.g., barrier games, narrative therapy), approaches to intervention (e.g., modelling, repetition, feedback, visual approaches to support language), service developed programmes, resources (e.g., communication books, mind maps, picture

symbols), training (e.g., Makaton), models or theories of intervention (e.g., Language Pyramid, Metalinguistic Theory, Blanks Levels of Questioning) and intervention targets (e.g., listening skills, conversation skills, attention, sequential memory). The study by Roulstone et al. (2015) used focus groups to collect descriptions from SLPs regarding the interventions they use. Responses from SLPs were coded by the researchers as: generic speech, language and communication activities; social communication and participation activities; expressive language activities; receptive language activities; materials; programmes; general strategies; language strategies; and non-speech, language and communication strategies; and other strategies. The authors noted that, although SLPs were encouraged to describe interventions in detail rather than naming specific materials, most interventions were coded as materials, language strategies, programs, or general strategies. Overall, both these studies identified lack of consistent terminology, with SLPs using general and non-specific descriptors to describe language interventions. Terms were open to multiple interpretations, for example, ‘visual approaches to support language’ could refer to numerous types of interventions.

Lack of detailed and consistent terms for describing interventions in detail has significant impact with regards to the depth of data that may be collected via survey research (Pring et al., 2012). Previous surveys of SLP’s intervention practices have focused on overt distinctions such as intervention service delivery methods (e.g., individual therapy, group therapy, consultative model, or interventions conducted by people other than SLPs; Gillon et al., 2017; Pring et al., 2012; Singh et al., 2016; Williams & McLeod, 2012), location of intervention (e.g., naturalistic settings versus clinical context; Koole et al., 2015; Siegel et al., 2010; Singh et al., 2016) or domains targeted in intervention (e.g., receptive language, expressive language, narrative skills, or vocabulary; Watson & Pennington, 2015). Some previous surveys have investigated the types of interventions or therapeutic techniques used by SLPs when delivering language interventions (Gillon et al., 2017; Law et al., 2019;

Lindsay et al., 2011; Roulstone et al., 2015; Singh et al., 2016; Williams & McLeod, 2012). Response options in these surveys related broadly to one or more of the following categories: commercial programs; intervention activities (e.g., ‘play’, ‘book reading’, ‘barrier games’, ‘structured activities’, ‘computer apps’); or intervention strategies or techniques (e.g., ‘modelling’, ‘expanding child’s language’, ‘recasting’, ‘following the child’s lead’, ‘signing’). However, terms for describing interventions varied notably across surveys. Overlap was noted in how interventions were described across different surveys, but also with how interventions were described within the same survey. For example, in the study by Roulstone et al. (2015), ‘visual timetables’ and ‘signing’ were listed as both an intervention activity and an intervention strategy. This lack of clarity of terminology for describing interventions makes it difficult to understand the specific nature of the language interventions that SLPs provide to children with language disorder.

Previous studies reviewing the effectiveness of language interventions have identified similar trends in relation to descriptions of language interventions. Typically, language interventions have been categorized in research studies by the name of a published intervention (Roberts & Kaiser, 2011), by service delivery method (e.g., individual therapy, group therapy, classroom-based therapy, interventions delivered by people other than SLP; Cirrin et al., 2010; Law et al., 2004; Law et al., 2019; Petersen, 2011) or by the skill domain targeted in the intervention (e.g., receptive language, expressive language, semantics, syntax; Cirrin & Gillam, 2008; Law et al., 2004; Law et al., 2019; Petersen, 2011). More recently, language interventions have also been described by the environmental context targeted in the intervention (i.e., naturalistic setting versus clinical context; Nordahl-Hansen et al., 2019). Some studies have reviewed the intervention strategies or techniques contained in interventions (Gerber et al., 2012; Lynch et al., 2018; Petersen, 2011; Pickstone et al., 2009); however, these studies all found that interventions are typically not described with enough

detail for strategies and techniques to be clearly identified. This poses barriers when comparing different interventions to identify which are most effective in different clinical situations (Law et al., 2008; Lynch et al., 2018). It also means that interventions in research studies may not be able to be replicated accurately in clinical practice (Roulstone, 2015).

In addition, there is growing evidence to suggest that the types of teaching strategies or techniques used in interventions may influence intervention outcomes (Gillam et al., 2012; Smith-Lock et al., 2015; Washington & Warr-Leeper, 2013). However, this is challenging to investigate when the key features in interventions that evoke maximal change are not described well enough to be explicitly identified (Roulstone, 2015; Smith-Lock et al., 2015). This is also a limitation when determining optimal intervention intensity because measuring intensity requires not only counting the number of sessions and length of intervention (i.e., intervention frequency and duration), but also identifying the types of tasks and procedures embedded in intervention and the number of times different techniques are used within each intervention session (Baker, 2012; Warren et al., 2007). Therefore, it is important that SLPs have detailed terminology for describing different language interventions, including terms for describing the types of tasks, procedures and the specific techniques embedded in interventions (Law et al., 2008; Roulstone, 2015).

Various frameworks already exist for describing language interventions; however, none are identified as being routinely used in either research or clinical practice (Roulstone, 2015; Walsh, 2011). This includes frameworks for describing healthcare interventions more generally, such as the International Classification of Functioning, Disability and Health (ICF; World Health Organization, 2001) or the International Classification of Health Interventions (ICHI; World Health Organisation, 2018). These frameworks are important for conceptualising the general areas targeted in medical and healthcare services; however, are designed to be broad in scope and thus do not provide the level of precision needed to

conceptualize specific practices within individual disciplines (Barnes & Bloch, 2018; Walsh, 2011). Similarly, guidelines exist for the reporting of health interventions, for example, Consolidated Standards of Reporting Trials (CONSORT; Schulz et al., 2010), Standards for Quality Improvement Reporting Excellence (SQUIRE; Ogrinc et al., 2015), and Standard Protocol Items: Recommendations for Interventional Trials (SPIRIT; Chan et al., 2013). These guidelines stipulate that interventions must be described with sufficient information to allow for replication; however, are not designed to provide explicit terminology for describing interventions in detail.

Discipline-specific frameworks have been proposed for reporting on child language interventions or dosage (Alt et al., 2020; McCauley et al., 2017; Warren et al., 2007). McCauley et al. (2017) identified a model for reporting on key elements of language interventions, including intervention procedures and activities as well elements related to dosage such as agent, context, and service model. Other frameworks designed for describing intervention dosage also include elements relating to intervention context and procedures (Alt et al., 2020; Warren et al., 2007). These existing frameworks are important for the child language field as they provide a structure for SLPs to use when describing interventions. However, these frameworks do not provide agreed-upon terms and definitions for describing the components in interventions, for example, terms for SLPs to use when describing the context, activities, or procedures within an intervention. Therefore, terms with agreed-upon definitions are needed to enhance the utility of existing frameworks.

Within SLP literature, sets of terms have been applied to distinguish between different types of language interventions. For example, interventions have been described by intervention purpose (i.e., remediation of skills versus compensatory strategies; Law et al., 2008; Paul & Norbury, 2012c); or by the degree of naturalness of intervention tasks, such as Fey's continuum of naturalness (Fey, 1986b). These terms identify important distinctions

between different language interventions, however; only describe interventions across a single feature, rather than multiple features (Roulstone, 2015). There are also no defined boundaries across literature as to the types of interventions that would or would not be covered by a specific term. For example, the characteristics of interventions described in literature as ‘naturalistic’ may vary widely and there is no agreed-upon criteria for deciding what characteristics must be present for an intervention to be described as ‘naturalistic’ (Hepting & Goldstein, 1996; Peterson, 2004).

To advance the field of child language intervention, SLPs need a taxonomy (i.e., framework) with well-defined terminology for describing language interventions across multiple features. This taxonomy would assist with reporting interventions with the level of detail necessary for effective replication across settings. It would also assist with making meaningful comparisons between different interventions and identifying the key features of interventions that may contribute to intervention intensity (Roulstone, 2015). The Delphi study technique is ideal for developing agreement on a taxonomy with terminology for describing language interventions. This methodology provides a structured process for establishing consensus between experts using a series of survey rounds (Diamond et al., 2014). Although the Delphi study technique has been utilized within the SLP field to establish consensus on conceptual or diagnostic issues (Bishop, 2017; Izaryk & Skarakis-Doyle, 2017), it has not yet been used to establish agreement on terminology for describing child language interventions.

It is also important that terminology for describing language interventions is able to be applied consistently by SLPs. However, although previous studies have reported on challenges with establishing consistent use of professional terminology in relation to diagnostic terms or child language assessment (Bishop, 2017; Denman et al., 2020); no studies have investigated the consistency with which SLPs apply agreed-upon terminology

when describing language interventions. Examining the specific complexities associated with applying a taxonomy with terms for describing language interventions is necessary for refining the development of the taxonomy and identifying future actions that may facilitate consistent application of terminology for describing language interventions.

The current study

The first objective of this study was to develop a taxonomy that is agreed upon by experts and provides distinct, well-defined categories for describing language interventions used in research and clinical settings for school-aged children (aged 4-18 years). Since it is recognized that challenges may exist with applying agreed-upon terminology, the second objective was to investigate SLP's application of taxonomy terminology when describing language interventions presented in clinical case studies.

For the purposes of this study, 'language intervention' is any intentional action that aims to extend a child's language skills or behaviors beyond what would occur naturally (Paul & Norbury, 2012c). Interventions contain repeated opportunities for target practice (i.e., deliberate and planned practice of skills); intense focus across practice sessions (i.e., high dosage and intensity); systemic support (i.e., intentional scaffolding using specific techniques); and explicit focus on selected skills (i.e., identified goals; Ukrainetz, 2006a). In relation to the International Classification of Health Interventions (ICHI; World Health Organisation, 2018), language interventions may address physiological and psychological functions of body systems (i.e., body structure and functioning); execution of functional tasks (i.e., activities); or involvement in daily life situations (i.e., participation).

This taxonomy is intended to provide terminology for describing details of language interventions themselves. This taxonomy is not intended to describe diagnostic categories; philosophies for service provision (e.g., family-centred approach or educationally relevant approach); theories for language development or interventions (e.g., behaviourist approach or

cognitive approach); or specific goal-setting decisions (e.g., short, intermediate, or long-term goal setting).

Method

This study used a three round Delphi study with mixed-methods data collection and analysis. As this was the first study aimed at establishing agreement on terminology for describing language interventions and recognising that developing consensus on professional terminology may be complex (Bishop, 2017), this study concentrated on SLPs in a single country (Australia). However, it is anticipated that outcomes from this initial study will provide an important foundation for future research with participants from other countries. A taxonomy for describing language assessments was also developed in the same Delphi study using the same participants; however, this taxonomy has been reported in a separate publication (Denman et al., 2019).

Participants

Delphi study participants were clinicians, researchers, or academics working in the field of child language. Participants were required to meet the following criteria: (1) eligibility for certified practicing membership with the Australian professional association for SLPs (Speech Pathology Australia); and (2) have spent at least 5 years (full-time equivalent) in the last 10 years engaged in activities where 50% or more of professional time was related to children aged 4-18 years with a language disorder. Activities included provision of clinical services, academic teaching, research, consultancy, resource development, provision of SLP professional development, or a combination of these activities. In Australia, speech language pathologists are qualified to provide clinical services upon completion of a four-year undergraduate bachelor's degree or a two-year graduate-entry masters (coursework) degree. Speech language pathologists also have the option of completing further postgraduate studies (i.e., Master's degree or PhD).

Potential participants were identified from the Speech Pathology Australia Find a Speech Pathologist website (<https://www.speechpathologyaustralia.org.au>), the Speech Pathology Australia 2016 National Conference attendance contact list and the professional networks of the authors. In total, 202 potential participants received emails inviting them to participate in the Delphi study. All 77 SLPs who responded to the invitation and indicated they were eligible for the study were provided with a link to the first survey round. As each Delphi study round build upon information presented in the previous round, participants who did not complete a survey round were ineligible to participate in following rounds. Round one was completed by 55 participants (55/77 or 71.4% response rate), 43 completed round two (43/55 or 78.2% response rate) and 32 completed round three (32/43 or 74.4% response rate). Participant demographics for each round are presented in Table 1.

<Insert Table 1 about here>

Procedure

As previous literature has identified that SLPs use general and non-specific descriptors when describing their clinical practice (Cowie et al., 2001; Roulstone, 2015), a deductive (top-down) approach led by theoretical literature and expert opinion was considered appropriate for this study, as opposed to an inductive (bottom-up) approach led by clinical practice (DeJong et al., 2004). To identify concepts and terms for describing language interventions the first author reviewed publications in the field of child language intervention and identified key concepts or terms that describe distinctions between different types of child language interventions. These publications included theoretical literature, descriptions of interventions in research studies (e.g., systematic reviews and effectiveness studies) and descriptions of interventions in clinical practice (e.g., surveys of clinical practice). A list of references that were reviewed in the creation of each taxonomy Aspect is provided in Supplementary Material 1.

The initial taxonomy was then created through an iterative process involving reviewing literature, discussion amongst the research team, further review of the literature and then further discussion to refine the taxonomy terms. Throughout this iterative process, the researchers classified a wide range of different interventions using terms to test the applicability of terminology. Selected terms were then structured into a taxonomy covering five Aspects: language modalities and domains (Aspect I), intervention purpose (Aspect II), delivery methods (Aspect III), intervention form (Aspect IV) and teaching techniques (Aspect V). Aspects were numbered arbitrarily for ease of reference and the order of Aspects does not represent any particular meaning. Given that all Aspects describe important features of interventions, no single Aspect is identified as being important than others.

The proposed taxonomy was then presented to the Delphi study participants for them to rate their agreement, suggest changes, and provide comments. Each of the three Delphi study rounds consisted of an online survey created using Qualtrics software (Qualtrics, 2017). To address the first research objective of developing a taxonomy with terminology that is agreed-upon by experts, participants were asked to indicate their level of agreement with each taxonomy Aspect. Two questions targeted each of the five Aspects: participants were asked to indicate agreement with the structure (i.e., organization and content) of each Aspect and were then asked to indicate agreement with definitions of the components and categories (i.e., terms) in each Aspect. These questions had Likert scale responses: “Strongly agree”, “Agree”, “Neither agree or disagree”, “Disagree” or “Strongly disagree”. Participants who did not “Strongly agree” or “Agree” with the structure or definitions of an Aspect were asked an open-ended question about what they would change with regards to the structure or definitions within the aspect. Open comment boxes were also available for any participant to make further comments on the taxonomy.

To address the second research objective of investigating SLP's application of taxonomy terminology, participants were presented with language interventions and were asked to select terms from each taxonomy Aspect to describe the interventions across all taxonomy components. Open-ended questions were also included for participants to comment on applications of the taxonomy. In the first Delphi round, questions related to objective two asked participants to describe four published intervention approaches that were identified by name and a short description. These interventions were: Active Listening for Active Learning (Johnson & Player, 2009), Picture Exchange Communication (Frost & Bondy, 2002), Robust Tier Two Vocabulary Instruction (Beck et al., 2013) and Shape-Coding (Ebbels, 2007). These interventions were chosen as they have manualized guidelines for implementation and each cover different components within each taxonomy Aspect. Participants who indicated that they were not familiar with an intervention were not required to categorize that particular intervention. Each of the four interventions presented in round one was categorized across all five taxonomy Aspects by at least 25 participants.

After analysis of data from the first Delphi round, a decision was made to present interventions in clinical case studies in Delphi rounds two and three. The case studies helped to ensure that participants were considering a consistent clinical context when describing interventions. In addition, all participants were able to categorize each intervention because all the information needed to describe each intervention was provided in the case study. The same two case studies were used in survey rounds two and three. Case study one described intervention for a 4;10 year old child with Autism Spectrum Disorder using Picture Exchange Communication (Frost & Bondy, 2002) and case study two described a whole class intervention with a middle school science class using Robust Tier Two Vocabulary Instruction (Beck et al., 2013). The survey questions for each round are provided in

supplementary material 2. The case studies used in rounds two and three are provided in supplementary material 3.

In all Delphi rounds, participants were provided with a reference document which outlined the proposed taxonomy, background information and relevant references to literature. After each round, changes to the taxonomy in response to participant responses were made by adjusting the reference document. In rounds two and three, participants were also presented with a document summarizing the group consensus results from the previous round. Participants were able to refer to both documents whilst completing the surveys.

Ethical approval for this study was obtained from the Curtin University Human Research Ethics Committee (Approval number: HRE2017-0126). Information on the study was provided to participants at the beginning of each round and participants were required to consent to participate before accessing the survey for each round. The study was conducted between April-October 2017 with each survey being open for a three to seven-week period during this time. Prior to commencement of the study, two SLPs trialled the round one survey and provided feedback on the clarity of questions and completion time. Surveys took on average 90 minutes to complete. Participants were not required to complete surveys in one sitting as each survey could be partially completed and saved for later completion.

Analysis

Quantitative data from all survey rounds was analysed using the Statistical Package for the Social Sciences (SPSS) version 20 software (IBM Corp, Released 2011). This data provided information on the level of agreement with the taxonomy and the level of agreement with categorization of interventions (Likert scale and multi-choice questions). The criteria for agreed consensus were determined before the commencement of round one. For objective one, consensus with taxonomy structure and definitions for each Aspect was considered to have been reached when 75% or more participants selected “Strongly Agree” or “Agree”

(i.e., median score of 4 or more and interquartile range [IQR] of 1 or less; Diamond et al., 2014). For objective two, consensus on the categorization of interventions was achieved when 75% or more participants selected (or opted not to select) a taxonomy category for an intervention (i.e., when a category was selected by 25% or less or 75% or more participants). Prior to conducting Delphi rounds, the study authors also categorized each intervention using taxonomy terms. The authors' categorizations were not provided to participants. Concordance between the author's categorizations and Delphi participants' categorizations was not a requirement for consensus; however, the comparison provided additional information when examining application of the taxonomy.

Qualitative analysis of participants' responses to open-ended survey questions was undertaken using conventional content analysis (Hsiu-Fang & Shannon, 2005) with themes identified for each of the five taxonomy Aspects. Analysis was undertaken by the first author, who was blinded to the identity of participants and themes were reviewed by the other authors. Qualitative themes were then considered alongside quantitative data to identify changes in subsequent rounds that may facilitate either consensus with the taxonomy or consensus with application of the taxonomy when describing language interventions.

Results

Objective one: Taxonomy structure and definitions

Consensus was reached in both rounds one and two on the structure and definitions of the taxonomy, with all participants "strongly agreeing" or "agreeing" with the overall structure of the taxonomy and at least 87.3% of participants "strongly agreeing" or "agreeing" with the components and definitions of categories within every aspect. No participants expressed strong disagreement with any taxonomy Aspect. Data depicting the level of consensus for each Aspect are provided in Table 2. Consensus on the taxonomy

structure and definitions was established in both Delphi rounds one and two, thus objective one was not repeated in the round three survey.

<Insert Table 2 about here>

The structure of the finalized taxonomy after round three is represented in Figure 1. The five Aspects within the taxonomy are labelled in Roman numerals I-V. All interventions are described using all five taxonomy Aspects. Each Aspect contains terms for describing interventions across different components, with each component having multiple categories. In total, across all Aspects, there are twelve components and 54 categories. The finalized definitions for each taxonomy category are provided in Supplementary Table 4.

<Insert Figure 1 about here>

Aspect I (Modalities and Domains). Aspect I provides terminology for describing the language modalities and domains explicitly targeted in an intervention. As the structure and definitions in Aspect I are the same for language assessment and intervention, participants rated their agreement on Aspect I once in relation to both. Hence, agreement on Aspect I is the same across both the assessment and intervention taxonomy (Denman et al., 2019). As depicted in Figure 1, interventions are first described by the modality targeted: spoken and written (including multimodal forms of spoken and written communication). Interventions are then described by the domain targeted: semantics, morphosyntax, social abilities & discourse, meta-abilities, and executive functions. Finally, interventions are described as targeting comprehension (reception) or production (expression) of language. The categories in the components within Aspect I are not mutually exclusive (i.e., an intervention may target one or multiple categories in each of the three components).

Between rounds one and three, changes to Aspect I as a result of participant feedback included: changes to the structure of the taxonomy by placing the categories ‘comprehension’ and ‘production’ after other Aspect I categories and amalgamating ‘social abilities’ and

‘discourse’ into one category. Additional information was added to explain the application of Aspect I for children who are at a pre-linguistic level of communication or who use multi-modal communication. Additional clarification was also added to highlight that interventions are described by the main domains explicitly targeted in the intervention, as opposed to all possible domains that a child may utilize in completing an intervention task.

Aspect II (Purpose). Aspect II contains terms for describing the primary purpose of an intervention. As shown in Figure 1, Aspect II has one component with two categories: skill development (remediation) and strategy use (compensation). Interventions conducted for the purpose of skill development aim to improve communication by directly teaching skills that are impaired. Interventions aimed at strategy use aim to improve communication by teaching functional strategies. These two categories are mutually exclusive (i.e., an intervention has only one primary purpose), based on the category that best describes the purpose of the intervention.

During the Delphi study rounds, changes to Aspect II in response to participant feedback included changing the category names from ‘remediation’ to ‘skill development’ and from ‘compensation’ to ‘strategy use’. Additional information was also added to the definitions to explain that interventions are categorized based on the category of best fit and that ‘skill development’ does not imply that full ‘remediation’ will be achieved.

Aspect III (Intervention Delivery). Aspect III has four components for describing the delivery methods according to: the manner through which intervention is provided, the tier at which support is provided and the environmental context targeted in the intervention. The structure of Aspect III is shown in Figure 1. Delivery methods include interventions conducted by an SLP, by another trained person or through a software program. Interventions conducted by a SLP or another trained person may occur either face-face or via telehealth using information and communication technology (ICT). Tier of support includes

intervention delivered to whole class of children, a small group of children or an individual child. The environmental context categories distinguish between a clinical context or a community context such as home, school or another context. The categories in Aspect III are mutually exclusive from other categories within the same component (i.e., an intervention is delivered via one method, at one tier of support, and targets only one environmental context).

Changes to Aspect III over Delphi study rounds included changes to the category names in some components. To help remove ambiguity, the category names ‘direct’ and ‘indirect’ were changed to ‘delivered by SLP’ and ‘delivered by other’ and the category name ‘internet’ was changed to ‘information and communication technologies’. To highlight that context is being identified (rather than physical location), the descriptor ‘environmental setting’ was changed to ‘environmental context’. Additional information was also added to further clarify the definitions of some terms. For example, information was added to the definition of ‘administered by others’ to explain that this term refers to the person who is primarily delivering the intervention, rather than the SLP time commitment (i.e., interventions administered by others may still require significant time from the SLP to ‘train’ the other person). Information was also added to the definition of “software” to clarify that this term is used to describe interventions that are conducted predominantly through a computerised process and information was added to the definition for ‘information and communication technologies’ to clarify that this term is applied to technologies that are used for two-way communication. Clarification and examples were also added to the definitions for ‘environmental context’ to clarify that these categories are used to identify the intervention context rather than the physical location in which intervention takes place.

Aspect IV (Form). Aspect IV has one component with categories for describing intervention form (i.e., types of intervention tasks). Tasks are described in terms of naturalness of communication, degree of structure within the intervention tasks and theoretical orientation

(see Supplementary Material 4). The four categories in Aspect IV are shown in Figure 1 and include de-contextualized hierarchical, de-contextualized non-hierarchical, de-contextualized contextualized, and activity-focused (Ukrainetz, 2015a). De-contextualized interventions target discrete skills in highly structured tasks that are selected and directed by the adult. Contextualized interventions are structured and directed by the SLP but occur in meaningful, natural interactions between the child and the adult. Activity-focused interventions occur within the child's regular everyday activities or school curriculum, with adults responding to the child's communication by providing scaffolding and supports. Decontextualized interventions may also be described as hierarchical or non-hierarchical. Hierarchical interventions teach skills in a set sequence, with progress to subsequent tasks dependent on mastery of previously targeted skills. Non-hierarchical interventions are designed to stimulate a range of skills and do not follow a defined sequence in terms of skill acquisition. The categories in Aspect IV are mutually exclusive (i.e., an intervention is categorized as being only one task type, based on the category of 'best fit').

Over Delphi study rounds, further examples were added to the definitions of the task type categories in Aspect IV in response to participant feedback. Information contained in the definitions was also formatted under headings to highlight the key features of each task-type according to naturalness of communication, intervention structure and theoretical background.

Aspect V (Teaching Techniques). Aspect V contains terms for describing the teaching techniques embedded within interventions. Teaching techniques are observable actions that aim to change performance either immediately or over time. Teaching techniques are not mutually exclusive (i.e., an intervention may contain only a few or many teaching techniques). Within Aspect V, teaching techniques are organized into the following three components (i.e., three types of techniques): prompting, linguistic, and regulatory (Ukrainetz,

2006a). Interventions do not have to contain techniques involving all components, although it is expected that most interventions would include techniques from each component. For example, most interventions would use prompting and linguistic techniques to elicit a response from a child, and regulatory techniques to provide feedback to the child on the response that was elicited.

Prompting techniques are prompts or cues that intend to elicit an immediate response or action from a child (Baker, 2012). These can be measured or counted, for example, an SLP may ask closed and open-ended questions to elicit 50 productions of past tense verbs from a child during an intervention session. The child's response to prompts may be verbal or non-verbal, depending on the goal being targeted or the child's mode of communication. Prompting techniques are repeated to elicit a target multiple times for practice; are selected depending on a child's current level of ability; and are reduced (faded) over time to lead to greater independence from the child. Prompting techniques include time delays, physical (tactile) prompts/cues, gestural prompts/cues, visual (pictures, symbols and written) prompts/cues, verbal (auditory) prompts/cues and modelling for imitation. Verbal (auditory) prompts/cues include closed and open questions, suggestions, cloze completion and phonemic prompts.

Linguistic techniques do not intend to elicit an immediate response from the child, however are used repeatedly to demonstrate a target response or demonstrate particular linguistic structures to facilitate language development over time (Baker, 2012). These techniques can be measured or counted, for example, an adult may provide 50 expansions of a child's utterance in an intervention session to model Subject-Verb-Object sentence structures. Linguistic techniques include modelling for demonstration (adult model, peer model, or video feed forward), think-aloud(s), focused contrast, inflectional model for demonstration, recasts/expansions, and extensions (Ukrainetz, 2006a).

Regulatory techniques facilitate the learning process; however, are not directly aimed at eliciting a response from a child or demonstrating a particular target response (Ukrainetz, 2006a). These techniques may be considered important techniques for achieving intervention outcomes; however, may not always be counted per unit of time when reporting on intervention dose in the same way that prompting or linguistic techniques may be counted. For example, as part of the intervention process, an SLP may explicitly explain the goals for intervention sessions to the child, provide rewards to assist with maintaining the child's motivation, or provide feedback to the child on their responses. Regulatory techniques include explicit (verbal or visual) instructions on tasks to be completed, relating new content to prior knowledge, explanation (visual or verbal) of goals/expectations, feedback, and rewards. Feedback may include verbal feedback, visual feedback, natural consequence, or repetition of the child's own response to encourage self-correction.

Changes to Aspect V over Delphi study rounds in response to participant feedback included the inclusion of additional explanation for the 'prompting', 'linguistic' and 'regulatory' components and the addition of a new category for 'gestural prompting'. Further examples were also added to the definitions of terms relating to 'verbal prompting', and terms related to 'feedback' and 'rewards' to improve the clarity of definitions.

Objective two: Categorization of interventions in case studies using the taxonomy

At the end of round three, participants reached consensus regarding 45 out of 54 terms or four out of the twelve components for case study one (Picture Exchange Communication) and 45/54 terms or seven out of the twelve components for case study two (Robust Tier Two Vocabulary Instruction). At the end of round three, categories that participants reached consensus on were aligned with the authors categorisations (i.e., participants reached consensus on the same categories that the authors selected). Table 3 provides the level of agreement in rounds two and three for each taxonomy category in each case study.

Supplementary Material 5 contains a summary of the themes identified from participant comments and associated changes to the taxonomy over Delphi study rounds.

<Insert Table 3 about here>

In relation to Aspect I (Modalities and Domains), participants did not reach consensus on the categories ‘semantics’ and ‘comprehension’ for case study one and the category ‘morphosyntax’ for case study two. Comments from participants suggested the following reasons for lack of consensus on categorization of case studies: (1) all possible domains involved in a task were described, rather than the primary domains being targeted in the intervention (e.g., identifying that comprehension or semantic knowledge is involved in all types of tasks); and (2) categorization of interventions for children who use multimodal communication were unclear (e.g., whether multimodal communication itself targets semantics).

Agreement for Aspect II (Purpose) was achieved in round two for case study two, but not for case study one. Further explanation was provided to highlight that interventions should be categorized based on the language skills targeted, regardless of speech output or communication modality; and that interventions are categorized based on the category of ‘best fit’. This resulted in consensus being reached for case study one on Aspect II (Purpose) during round three. For Aspect III (Delivery), consensus was reached on all components by the end of round three, except for the environmental context targeted in case study one. Participants commented that consensus may be influenced by participants’ interpreting the environmental context as the physical location in which intervention is delivered. For Aspect IV (Form), agreement on task type categories was not achieved at the end of round three for either case study. Participants commented on the high level of information processing required when applying the taxonomy definitions to case studies and challenges

distinguishing between categories when describing case studies, particularly the ‘contextualized’ and ‘activity-focused’ categories.

Participants were also not in agreement on either case study with regards to Aspect V (Techniques) at the end of round three. Participants’ commented that categorization of case studies may have been influenced by the following five factors: (1) the high level of information processing required from participants when applying the taxonomy definitions; (2) participants considering multiple ways an intervention *could* be conducted, rather than how the intervention *was* conducted based on information presented in the case study; (3) being unfamiliar with the structure within Aspect V (i.e., the differences between prompting, linguistic and regulatory techniques); (4) being unfamiliar with different techniques (e.g., visual prompts, visual explanations and visual feedback or the difference between natural consequence as feedback and rewards); and (5) participants being unsure about categorization of interventions for children who use multimodal communication (e.g., whether multimodal communication is itself a form of visual prompting).

Discussion

SLPs from a variety of employment settings and geographical locations agreed upon a taxonomy with terminology for describing child language interventions. Consensus on the structure and definitions within the taxonomy was established in both Delphi rounds one and two, with no participants strongly disagreeing with any aspects of the taxonomy. This new taxonomy provides clear and agreed-upon terminology for describing features of language interventions, which is an important step towards developing greater consistency in terminology use (Cowie et al., 2001). A particular advantage of this taxonomy is that it has multiple Aspects for describing interventions across multiple distinguishing features. Whilst interventions may be described across only one taxonomy Aspect, describing interventions across all five Aspects provides the most comprehensive and detailed description of

interventions. This detailed terminology may assist when describing interventions for replicating across settings, comparing different interventions, and measuring intervention intensity. This, in turn, will help facilitate future research aimed at identifying which features within language interventions are most important in achieving maximal intervention outcomes.

Findings from this study indicate that, even when terminology is agreed-upon, consistent application of terminology may still be challenging. In this study, participants agreed upon 45/55 categories for each case study at the end of round three. However, as the categories that did not reach consensus spanned across different components, this resulted in four out of twelve components being agreed upon for case study one and seven out of twelve components being agreed upon for case study two. Literature from the field of implementation science acknowledges, that even when SLPs agree with practice innovations, significant challenges exist in relation to successful implementation of new practices (Cheung et al., 2013; Olswang & Prelock, 2015). It is also prudent to identify that previous studies have also reported on a broader problem in relation to consistent use of terminology by SLPs (Roulstone, 2015). A study by Cowie et al. (2001) examined terminology used in SLP's clinical case notes and identified that terminology was not only used inconsistently by different SLPs, but in different case notes written by the same SLP. It is possible that the initial taxonomy may have influenced SLPs application of taxonomy terms; however, it is also possible that, even if SLPs were asked to apply different set of terms, consistent application of terms may be challenging.

As this Delphi study followed a deductive approach in which the initial taxonomy was compiled from literature, applying the taxonomy terminology may require SLPs to use terms differently to how they may have previously used terms, which likely requires explicit attention and practice. Consistent application of a taxonomy may be a challenge when the

field continually refines and operationalizes frameworks related to language interventions. Intervention intensity literature is a case in point. Although our taxonomy definitions themselves do not refer to intensity and dosage, our taxonomy may be used alongside other frameworks to facilitate detailed and consistent reporting on intervention intensity. For example, when describing interventions using the model proposed by McCauley et al. (2017), Aspect III (Delivery) may be used to describe components of dosage relating intervention context and service model, Aspect IV (Form) may be used to describe intervention activities and Aspect V (Techniques) may be used to describe procedures. When reporting on intervention intensity according to (Warren et al., 2007), the taxonomy definitions in Aspect IV (Form) may be used to describe ‘dose form’ and definitions in Aspect V (Techniques) may be used to describe the ‘teaching episodes’. According to (Alt et al., 2020), the taxonomy definitions for environmental context in Aspect III (Delivery) may be used to describe ‘treatment context’ and definitions in Aspect V (Techniques) may be used to describe the ‘dose’ and ‘dose form’. Therefore, further research is needed to test how applicable definitions within a taxonomy are for practising SLPs when iterations and refinements to existing frameworks occur. Findings from this Delphi study indicated that terminology in taxonomy Aspects I, II and III were more consistently applied compared with terminology used in taxonomy Aspects IV and V. Nonetheless, at the end of round three, SLPs continued to disagree as to whether case study one targeted the Aspect I (Modalities and Domains) categories of semantics and comprehension; whether case study two targeted the Aspect I (Modalities and Domains) category of morphosyntax; and whether case study one targeted Aspect III (Delivery) categories of clinical context or home context. Participants indicated that application of categories in Aspect I (Modalities and Domains) may be influenced by SLPs’ selecting a range of domains involved in the intervention, or selecting domains that are targeted incidentally, as opposed to identifying only the language modalities

and domains that are specifically targeted in an intervention. For example, identifying that a child is utilising language comprehension skills whilst participating in interventions specifically aimed at developing language production skills.

To help develop professional understanding of how the specific modalities and domains targeted by an intervention may make a difference to intervention outcome (Law et al., 2003), it is important that interventions themselves are described only by the categories that are specifically targeted. For instance, although participation in intervention may lead to a child making gains that were not specifically targeted by the intervention, this may be captured through the use of broad-based outcome measures (Thomas-Stonell et al., 2009). Therefore, the taxonomy presented in our study provides SLPs a basis on which they can make distinctions between specific intervention targets versus broad areas that may be assessed to accommodate service outcome measurement.

Interestingly, inconsistency with the application of terms for describing semantics (Aspect I: Modalities and Domains) and environmental context (Aspect III: Delivery) was also found when the same participants categorized language assessments (Denman et al., 2019). This identifies that differences in application of terms in both these Aspects may exist more broadly, rather than being specific to descriptions of language interventions. Previous studies have identified that SLPs' language intervention practices may vary widely depending on the theoretical orientation adopted by them (Ukrainetz, 2005), and it is possible that this influences application of terminology. For example, SLPs who favor assessing and teaching discrete skills in isolated tasks (i.e., de-contextualized assessments and interventions) may find it challenging to recognize distinctions between different environmental contexts. SLPs who prefer assessing and teaching language skills within meaningful discourse (i.e., contextualized assessment and interventions) may tend to view domains such as 'semantics' and 'morphosyntax' as being targeted in all types of language tasks. To further investigate

these possible relationships, future research could explore how different theoretical orientations influences descriptions of language interventions. It is also likely that differences in terminology use may stem from differences in SLP training. Therefore, this taxonomy provides terminology for describing language interventions in a consistent manner regardless of training or theoretical orientation.

The greatest inconsistency in application of taxonomy terms was observed for taxonomy Aspects IV and V. Participants commented that taxonomy Aspects IV and V were cognitively taxing to apply when describing case studies. For example, SLPs reported that deciding between the task-type categories ‘contextualized’ and ‘activity-focused’ was particularly challenging, as was identifying the specific types of visual materials used. Although all the categories within the taxonomy were identified from literature in the child language field prior to being presented to Delphi study participants, extant literature has predominantly described child language interventions by the more overt features captured in taxonomy Aspects I-III. Therefore, the clinical application of the distinctions in Aspects IV and V are likely to be much less familiar to SLPs.

Furthermore, the definitions in Aspects IV and V include reference to the purposes that different intervention tasks or teaching techniques are being used for. For example, rather than simply identifying whether an intervention includes visual supports, the taxonomy requires SLPs to identify the purpose of visual supports (i.e., to prompt a response, provide explicit instruction, or provide feedback). Roulstone (2015) identified that SLPs experience difficulty identifying the reasons and purposes for use of language interventions. Therefore, SLPs may find applying taxonomy Aspects IV and V challenging due to the level of reflective thinking required (Denman et al., 2020). Having access to this taxonomy with well-defined terminology has the potential to facilitate SLPs with making clearer distinctions

between the less overt features of interventions and being more explicit when describing the purpose of different features within language interventions.

It is acknowledged that SLPs who participated in this Delphi study were required to read and apply a large volume of information over a relatively short period of time. It is possible that if participants had more time to become familiar with the taxonomy and training in applying taxonomy terms, then consistency of application may improve. Therefore, to make progress with establishing consistent application of terms for describing language interventions, the terminology used in the taxonomy first needs to be taught through training programs and continuing professional development, for example, in professional learning modules. This includes provision of practical examples to give SLPs experience with applying the taxonomy (Denman et al., 2020). Future research should investigate application of terminology with participants who have developed knowledge and experience with the taxonomy. This will assist with identifying if further actions, such as refinements to the taxonomy, are needed to facilitate consistent application of taxonomy terminology. It is also possible that consistency with use of terms may vary depending on the types of interventions being described. Therefore, future research is needed to examine application of the taxonomy with different case studies to those used in this study.

Limitations

In this study, consensus on the taxonomy was established in round one before any participant drop-out occurred; however, participant drop-out may present as a limitation in rounds two and three with regards to consensus on categorization of case studies (Hasson et al., 2000). Nonetheless, a varied spread in participant demographics was maintained in round three and the response rate for both rounds two and three was still above the 70% minimum response rate identified in literature for rigor across a Delphi study (Sumsion, 1998).

Participants in this study were limited to SLPs in a single country (Australia). Since much of the literature that informed development of the taxonomy was drawn from the United States and United Kingdom, it is expected that the taxonomy would be applicable across English-speaking countries. However, further research with participants from other countries is needed to confirm this.

Although participants varied widely in terms of professional backgrounds and geographical locations; as with any Delphi study, it is possible that different findings would have been reached with a different group of participants. It is also possible that the initial taxonomy itself may have influenced the application of the taxonomy, therefore the outcome for objective two may have been different if the study had used a different methodology in developing the initial taxonomy, such as an inductive approach. The use of case studies in the Delphi study assisted the refinement of terms and definitions within the taxonomy and allowed for the application of the taxonomy to be investigated. However, it was not possible to comprehensively examine application of the taxonomy using only two case studies, so it is also acknowledged that the use of case studies with different types of interventions may have also resulted in different outcomes for objective two.

Conclusion

Lack of consistent and detailed terminology for describing child language interventions poses barriers in clinical practice and research. To assist with addressing this problem, this study developed consensus from SLPs on a comprehensive taxonomy with defined terminology for describing language interventions for school-aged children across multiple aspects. The high level of agreement with the taxonomy from SLPs from varied employment settings represents a significant step towards establishing detailed descriptions of child language interventions. The taxonomy may be used to facilitate detailed descriptions of interventions in research studies for accurate replication into clinical settings. It may also

assist with making explicit comparisons between different interventions and identifying key features when measuring intervention intensity. Future research should focus on further investigating SLPs' application of taxonomy terminology when describing language interventions in clinical contexts.

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Table 1. Participant demographics

Category	Round One n (%) Total = 55	Round Two n (%) Total = 43	Round Three n (%) Total = 32
Years of experience (full-time equivalent)*			
5-10 years	10 (18.2%)	7 (16.3%)	5 (15.6%)
11-15 years	10 (18.2%)	9 (20.9%)	8 (25.5%)
16-20 years	13 (23.6%)	9 (20.9%)	9 (28.1%)
21-30 years	12 (21.8%)	9 (20.9%)	5 (15.6%)
30+ years	10 (18.2%)	9 (20.9%)	5 (15.6%)
Qualifications in addition to bachelor or graduate equivalent*			
Masters or PhD	24 (43.6%)	18 (41.9%)	15 (46.8%)
Diploma in Education or Psychology	2 (3.6%)	2 (4.7%)	1 (3.1%)
No additional qualifications	29 (52.7%)	23 (53.5%)	16 (50.0%)
Employment setting*			
Education (School) Sector	18 (32.7%)	17 (39.5%)	16 (50.0%)
Health Sector	5 (9.1%)	5 (11.6%)	2 (6.3%)
Private Practice	10 (18.2%)	7 (16.3%)	4 (12.5%)
University	13 (23.6%)	10 (23.3%)	7 (21.9%)
Other agency (not listed above)	3 (5.5%)	2 (4.7%)	0 (0.0%)
Work across two of the above sectors	5 (9.1%)	2 (4.7%)	3 (9.4%)
Not currently working as an SLP	1 (1.8%)	0 (0.0%)	0 (0.0%)
Geographical location (State or Territory)			
Australian Capital Territory (ACT)	1 (1.8%)	1 (2.3%)	0 (0.0%)
New South Wales (NSW)	10 (18.2%)	7 (16.3%)	6 (18.8%)
Northern Territory (NT)	3 (5.5%)	1 (2.3%)	1 (3.1%)
Queensland (QLD)	7 (12.7%)	7 (16.3%)	5 (15.6%)
South Australia (SA)	7 (12.7%)	7 (16.3%)	6 (18.8%)
Tasmania (TAS)	3 (5.5%)	2 (4.7%)	2 (6.3%)
Victoria (VIC)	16 (29.1%)	11 (25.6%)	9 (28.1%)
Western Australia (WA)	8 (14.5%)	7 (16.3%)	3 (9.4%)

Notes: *As reported by participant; the participant group in this table is the same participant group as the study reporting on the assessment taxonomy (Denman et. al., 2019). The following figures indicate proportion of Australian total population who live in each state: ACT = 1.7%, NSW = 32%, NT = 1.7%, QLD = 20%, SA = 6.9%, TAS = 2.1%, VIC = 26.1%, WA = 10.3% (Australian Bureau of Statistics, Australian Government. Available at: <https://www.abs.gov.au>). These figures are provided to indicate that states/territories with smaller participant numbers are states/territories with lower total populations.

Table 2. Participant consensus with structure of taxonomy and definitions (*Objective One*)

Aspect of the taxonomy	Results					
	Median		IQR		Percentage agreement	
	Round 1 n=55	Round 2 n= 43	Round 1 n=55	Round 2 n=43	Round 1 n=55	Round 2 n=43
Aspect I Structure	4	5	1	1	92.7 (51)	97.7 (42)
Aspect I Definitions	4.5	4	1	1	90.9 (50)	93.0 (40)
Aspect II Structure	4	4	1	1	90.9 (50)	90.7 (39)
Aspect II Definitions	4	5	1	1	90.9 (50)	97.7 (42)
Aspect III Structure	5	5	1	1	92.7 (50)	90.7 (39)
Aspect III Definitions	4	5	1	1	96.4 (53)	90.7 (39)
Aspect IV Structure	4	5	1	1	92.7 (51)	95.3 (41)
Aspect IV Definitions	4	5	1	1	96.4 (53)	93.0 (40)
Aspect V Structure	4	5	1	1	87.3 (48)	97.7 (42)
Aspect V Definitions	4	4	1	1	89.1 (49)	93.0 (40)
Overall Structure^a	4	5	1	1	100 (54)	100 (43)

Table Key:

Percentage agreement: Percentage of participants who selected “agree” or “strongly agree”

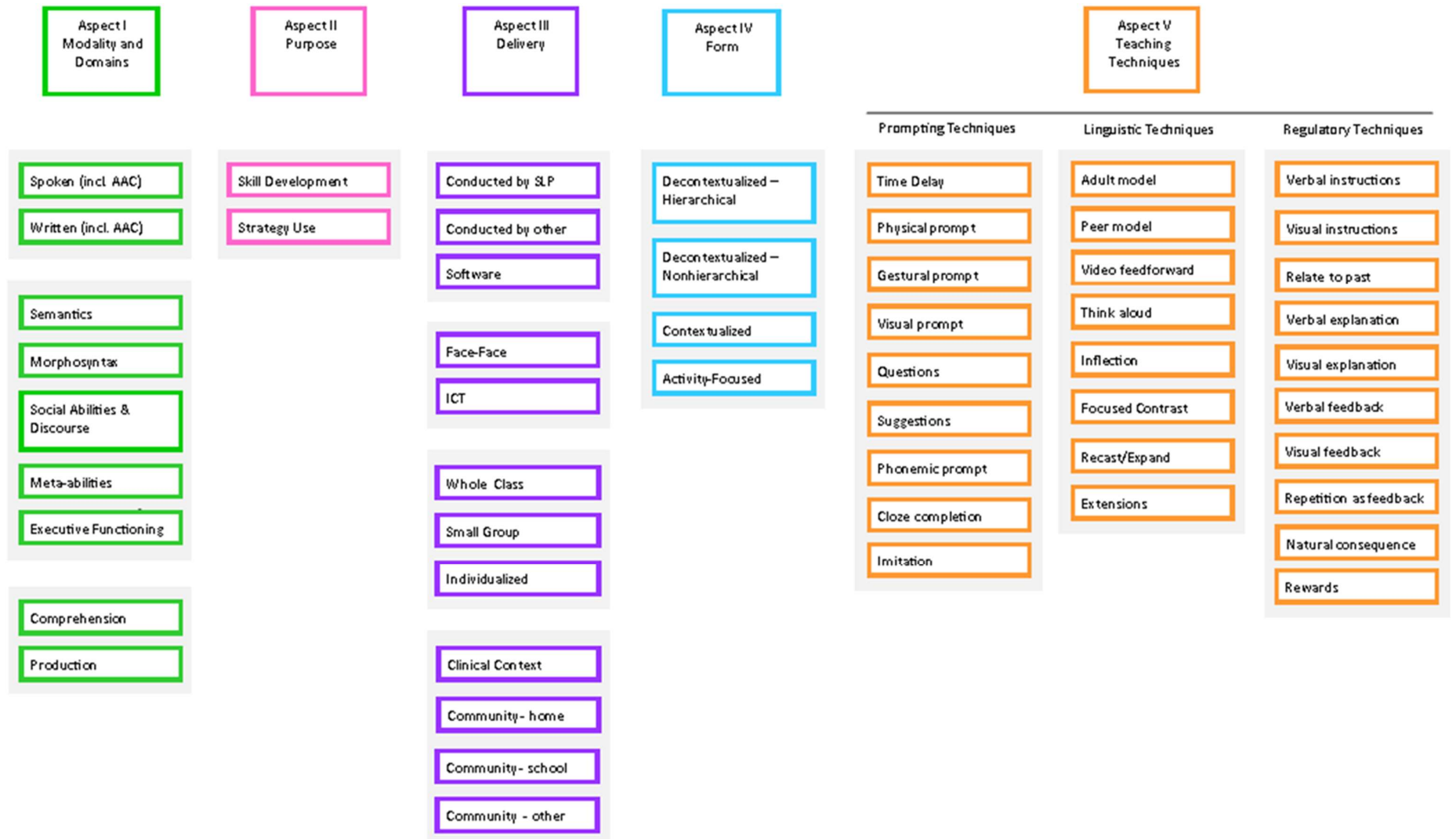
Scale: 5 = Strongly Agree, 4 = Agree, 3 = Neither Agree or Disagree, 2 = Disagree, 1 = Strongly Disagree

Median: The value that appears most often (i.e., the most frequently selected answer)

IQR: Inter-quartile Range i.e., the difference between the largest and smallest value in the middle 50% of the data (i.e., the range between the 75th and 25th percentiles)

^aDuring round one, 54 participants completed this question

Figure 1. Structure of the finalised taxonomy



**Table 3. Participant consensus with categorization of interventions in case studies
(Objective Two)**

Aspect within taxonomy	Components and categories within aspect	Results			
		Case Study 1		Case Study 2	
		Round 2 n=43 % of participants who selected category	Round 3 n= 32 % of participants who selected category	Round 2 n=43 % of participants who selected category	Round 3 n=32 % of participants who selected category
Aspect I (Modality/Domains)					
<i>Categories not mutually exclusive.</i>	Spoken	100 ^a	NA	81.4 ^a	NA
	Written	7.0	NA	100 ^a	NA
<i>Categories not mutually exclusive. In round 3, participants could only choose one category in addition to the categories already agreed-upon in round 2.</i>	Semantics	55.8 ^b	37.5 ^b	100 ^a	NA
	Morphosyntax	2.3	NA	34.9 ^b	31.1 ^b
	Social Abilities	93.0 ^a	NA ^c	2.3	6.3 ^c
	Discourse	11.6		25.6 ^b	
	Meta Abilities	4.7	NA	32.6 ^b	18.8
	Executive Functions	16.3	NA	18.6	NA
<i>Categories not mutually exclusive.</i>	Comprehension	53.5 ^b	28.1 ^b	95.3 ^a	NA
	Production	97.7 ^a	NA	100 ^a	NA
Aspect II (Purpose)					
<i>Categories are mutually exclusive.</i>	Skill Development	37.2 ^{ab}	87.5 ^a	88.4 ^a	NA
	Strategy Use	62.8	12.5	11.6	NA
Aspect III (Intervention Delivery)					
<i>Categories are mutually exclusive.</i>	Conducted by SLP	86.0 ^a	NA	4.7	NA
	Conducted by other	14.0	NA	95.3 ^a	NA
	Software	0.0	NA	0.0	NA
<i>Categories are mutually exclusive.</i>	Face-to-Face	100 ^a	NA	100	NA
	ICT	0.0	NA	0.0	NA
<i>Categories are mutually exclusive.</i>	Whole Class	0.0	NA	95.3 ^a	NA
	Small Group	0.0	NA	2.3	NA
	Individualized	100 ^a	NA	2.3	NA
<i>Categories are mutually exclusive.</i>	Clinic	74.4 ^b	28.1 ^b	0.0	NA
	Community - Home	25.6 ^{ab}	71.9 ^{ab}	0.0	NA
	Community - School	0.0	NA	100 ^a	NA
	Community – Other	0.0	NA	0.0	NA
Aspect IV (Form)					
<i>Categories are mutually exclusive.</i>	Decontextualized-Hierarchical	46.5 ^{ab}	50.0 ^{ab}	4.7	3.1
	Decontextualized-Non-Hierarchical	2.3	9.4	7.0	15.6
	Contextualized	25.6 ^b	21.9	48.8 ^b	37.5 ^b
	Activity-focused	25.6 ^b	18.8	39.5 ^{ab}	43.8 ^{ab}

Aspect within taxonomy	Components and categories within aspect	Results			
		Case Study 1		Case Study 2	
		Round 2 n=43 % of participants who selected category	Round 3 n= 32 % of participants who selected category	Round 2 n=43 % of participants who selected category	Round 3 n=32 % of participants who selected category
Aspect V					
(Teaching Techniques) Prompting Techniques <i>Categories not mutually exclusive.</i> <i>In round 3, participants could only choose up to two categories in addition to the categories already agreed-upon in round 2.</i>	Time Delay	41.9 ^{ab}	40.9 ^{ab}	11.6	NA
	Physical Prompt	90.7 ^a	NA	0.0	NA
	Gestural Prompt	74.4 ^{ab}	62.5 ^{ab}	0.0	NA
	Visual Prompt	69.8 ^b	62.6 ^b	34.9 ^b	9.4
	Questions	4.7	NA	44.2 ^{ab}	62.5 ^{ab}
	Suggestions	7.0	NA	69.8 ^b	21.9
	Phonemic Prompt	0.0	NA	4.7	NA
	Cloze Completion	2.3	NA	72.1 ^{ab}	59.4 ^{ab}
	Imitation	14.0	NA	27.9 ^b	0.0
	No Prompting Techniques	0.0	NA	4.7	NA
Linguistic Techniques <i>Categories not mutually exclusive.</i> <i>In round 3, participants could only choose up to two categories in addition to the categories already agreed-upon in round 2.</i>	Adult Model	65.1 ^b	50.0 ^b	93.0 ^a	NA
	Peer Model	2.3	NA	74.4 ^b	40.6 ^b
	Video-Feed Forward	0.0	NA	0.0	NA
	Think Aloud	0.0	NA	37.2 ^b	56.3 ^b
	Inflection	0.0	NA	9.3	NA
	Focused Contrast	2.3	NA	14.0	NA
	Recast/Expand	2.3	NA	25.6 ^b	47.0 ^b
	Extensions	4.7	NA	16.3	NA
	No Linguistic Techniques	34.9 ^{ab}	50.0 ^{ab}	2.3	NA
Regulatory Techniques <i>Categories not mutually exclusive.</i> <i>In round 3, participants could only choose up to two categories in addition to the categories already agreed-upon in round 2.</i>	Verbal Instruction	25.6 ^b	0.0	79.1 ^a	NA
	Visual Instruction	48.8 ^b	18.8	34.9 ^b	6.3
	Relate to Past Knowledge	4.7	NA	72.1 ^{ab}	50.0 ^{ab}
	Verbal Explanation	4.7	NA	86.0 ^a	NA
	Visual Explanation	9.3	NA	30.2 ^b	6.3
	Verbal Feedback	46.5 ^b	12.5	93.0 ^a	NA
	Visual Feedback	27.9 ^b	9.4	41.9 ^b	28.2 ^b
	Repetition as Feedback	20.9	NA	41.9 ^b	9.4
	Natural Consequence	74.4 ^{ab}	78.2 ^a	11.6	NA
	Rewards	58.1 ^b	28.2 ^b	27.9 ^b	0.0
No Regulatory Techniques	4.7	NA	2.3	NA	

Note. Case Study 1 = Picture Exchange Communication; Case Study 2 = Robust Tier Two Vocabulary Teaching; NA = this question was not asked in Round 3 as consensus was reached in Round 2; SLP = speech-language pathologist; ICT = information and communication technology.

^aCategories researchers expected would be selected for each case study. ^bCategories where inconsistency was identified (i.e., between 25% and 75% of participants selected this category). ^cIn round 3, the two categories of social abilities and discourse were combined into one category. The final taxonomy has a total of 12 components and 54 categories.

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References that informed the creation of each taxonomy Aspect.

Aspect One (Modality/Domain)



Background for Aspect One

Assessments and interventions for school-age children with language disorder may be described as targeting comprehension (reception) or production (expression) of language in spoken or written modes (including AAC) (American Speech and Hearing Association, n.d.; Cirrin & Gillam, 2008; Law et al., 2003). Target areas may include syntax/morphology, semantics, social abilities or structural elements in text or discourse (Apel, 2014; Beukelman & Mirenda, 2013b; Boyle et al., 2010; Law et al., 2003; Marton et al., 2005). Meta-abilities (Boyle et al., 2010; Hyter, 2003; Larson & McKinley, 2003b; Law et al., 2008; Robertson, 2007) and executive functions, particularly working memory (Hyter, 2003; Montgomery et al., 2010; Serry et al., 2008; Singer & Bashir, 1999; Ukrainetz, 2006b), may also be targeted in assessments and interventions for children with language disorders.

In this taxonomy, interventions are described by modality targeted (i.e., spoken or written), by domain/s targeted and as targeting comprehension or production. Note: Given the aim of this taxonomy, Aspect I is based on literature regarding areas that SLP's target in assessment and intervention of children with language disorder. This aspect is not intended to represent a theoretical construct for language; nor is it intended to be a framework for language processing or development.



Definitions for Aspect One

Spoken/Written (Modality)

Spoken Language: Language exchanged verbally (American Speech and Hearing Association, n.d.), or via an alternative to verbal communication in situations where peers would typically use verbal communication. This may also include pre-linguistic forms of communication.

- Single modality: using one mode i.e., speech-only (or AUSLAN for children with hearing impairment).
- Multi-modality: using multiple modes i.e., Key Word Sign or speech combined with symbols.

Written Language: Language exchanged through written text (American Speech and Hearing Association, n.d.), or via an alternative to verbal communication in situations where peers would typically use verbal communication.

- Single modality: using one mode i.e., text-only (or Braille for children with vision impairment).
- Multi-modality: using multiple modes i.e., text combined with symbols or use of pictures to support text.

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Domain

Semantics: Understanding and expression of words and word meanings, including vocabulary, word retrieval and lexical meaning (American Speech and Hearing Association, n.d.; Beukelman & Mirenda, 2013b; Boyle et al., 2007).

Morphosyntax: Understanding and expression of different word forms and the order and combination of words in sentences (American Speech and Hearing Association, n.d.; Beukelman & Mirenda, 2013b; Boyle et al., 2007).

Social Abilities and Discourse (Pragmatics): Giving and making meaning in social context or communication for social purposes (Beukelman & Mirenda, 2013b; Loukusaa & Moilanenb, 2009; Marton et al., 2005; Owens Jr, 2013; Paul & Norbury, 2012a). This includes:

- **Pre-linguistic communication:** Facial expression, gestures, joint attention etc. (Paul & Norbury, 2012b).
- **Communication intentions/purposes:** Requesting, commenting, asking questions, giving information, expressing an opinion, giving reasons, making predictions etc. (Beukelman & Mirenda, 2013b; Kaderavek, 2015a; Paul & Norbury, 2012a; Snell et al., 2006)
- **Non-verbal communication:** Understanding emotions from body language and facial expressions (Larson & McKinley, 2003b; Lopata et al., 2008; Wright et al., 2008).
- **Non-literal language:** Inferences, idioms, metaphors, jokes, sarcasm etc. (Loukusaa & Moilanenb, 2009; Vogindroukas & Zikopoulou, 2011).
- **Matching communication style to social context:** Adjusting communication style between friends and teachers (Larson & McKinley, 2003b; Paul & Norbury, 2012a)
- **Conversation conventions:** Topic selection, topic maintenance, conversational turn-taking etc (Kaderavek, 2015a).
- **Text cohesion:** Verbal fluency or transitions between sentences/paragraphs (Hall-Mills, 2010; Larson & McKinley, 2003b).
- **Text organisation (discourse or macrostructure):** Narrative structure (story grammar) or episodic structure (introduction/body/ending) (Boulineau et al., 2004; Hall-Mills, 2010; Kaderavek, 2015a; Wolf Nelson & Van Meter, 2007). Types of discourse include narrative, expository, persuasive and conversation (Hayward & Schneider, 2000; Kaderavek, 2015a; Nippold, 2010; Pearce et al., 2010; Westerveld & Claessen, 2014).

Meta-Abilities: Ability to think about own thought processes and understand how to regulate these processes for effective learning (American Speech and Hearing Association, n.d.; Larson & McKinley, 2003b; Law et al., 2008). This includes:

- **Meta-cognition:** Knowledge and use of strategies for managing and self-monitoring own learning (Larson & McKinley, 2003b).
- **Meta-language (includes phonological awareness, meta-linguistic and meta-narrative skills):** Knowledge of phonemic, morphological, syntactical, or text-level rules in relation to own skills; and ability to effectively apply these rules for improved performance (Larson & McKinley, 2003b).

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- **Meta-pragmatics:** Knowledge of social conventions in relation to own communication and ability to apply this knowledge to improve communication with others (Larson & McKinley, 2003b).

Executive Functions: Collection of related cognitive processes necessary for execution of goal-directed, controlled, purposeful behavior (Dawson & Guare, 2015; Henry et al., 2012; Singer & Bashir, 1999; Ukrainetz, 2006a; Wolter, 2007). These processes include:

- **Inhibition (self-control):** Suppression of inappropriate thoughts, comments and behaviors in order to focus and attend to tasks.
- **Emotion control (self-regulation):** Ability to manage emotions for goal achievement and task completion.
- **Working memory:** Retention, processing, and manipulation of pieces of information for short periods of time in order to complete required tasks.
- **Organisation (strategic planning):** Organisational strategies for task completion (e.g., envisioning the end product, planning steps to complete tasks, and formulating solutions to problems).
- **Mental flexibility:** Integration of prior knowledge and experiences when completing tasks and effective application of different rules for different situations.
- **Sustained attention:** Ability to maintain attention to tasks despite distractions and fatigue.

Comprehension/Production

Comprehension: Understanding of information, knowledge and ideas communicated by others either verbally or non-verbally (American Speech and Hearing Association, n.d.; Boyle et al., 2007; Law et al., 2003).

Production: Ability to convey information, knowledge, and ideas to others (either verbally or non-verbally (American Speech and Hearing Association, n.d.; Boyle et al., 2007; Law et al., 2003).

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Aspect Two (Intervention Purpose)



Background for Aspect Two

Interventions are typically undertaken for purposes of achieving typical development in relation to peers or addressing concerns related to academic performance and social-emotional wellbeing (Paul & Norbury, 2012c; Ukrainetz, 2015b; World Health Organisation, 2015). Intervention may focus on remediation by directly developing expected skills to alleviate impairment (Justice & Redle, 2014; Larson & McKinley, 2003a; Paul & Norbury, 2012c; Schraeder, 2008). Alternatively, intervention may focus on teaching strategies for improved learning and functioning (Justice & Redle, 2014; Larson & McKinley, 2003a; Paul & Norbury, 2012c; Schraeder, 2008). For example, teaching strategies to support learning in the presence of an impairment (Gill et al., 2003) or teaching use of assistive devices to improve performance (Shadiev et al., 2014) .

This taxonomy summarizes purposes of interventions skill development or strategy use.



Definitions for Aspect Two

Skill Development: Directly teach skills that impaired or lacking (i.e., lessen the degree of disorder or remediate deficits associated with a condition) for improved communication (Justice & Redle, 2014).

Strategy Use: Improve communication by teaching functional strategies. The intervention does not intend to directly alter the disorder but aims to teach use of strategies (i.e., compensatory strategies) for more effective communication (Justice & Redle, 2014).

Note: Use of AAC or multi-modal communication does not in itself alter the purpose of the language intervention. AAC may act as compensation for speech production; however, should not be viewed as compensation for language comprehension or production when applying this taxonomy.

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Aspect Three (Intervention Delivery)



Background for Aspect Three

Interventions may be delivered by SLP's or by another trained person (Boyle et al., 2007; Dickson et al., 2009; Law et al., 2003; McCauley et al., 2017; Reichow & Volkmar, 2010; Roberts & Kaiser, 2011; Zabiela et al., 2007); and may be delivered face-to-face or via ICTs (American Speech and Hearing Association, 2010; Edwards et al., 2012; Fairweather et al., 2016; Mashima & Doarn, 2009). Software programs may also be used to provide interventions (Gillam et al., 2001; Pokorni et al., 2004; Ramdoss et al., 2011). Interventions may be conducted individually or in groups (Cirrin et al., 2010; Larson & McKinley, 2003c; Schraeder, 2008) and may be delivered in different communicative environments (e.g., clinic, school, home, community) (Fey, 1986b; McCauley et al., 2017; Paul & Roth, 2011; Reichow & Volkmar, 2010; Snell et al., 2006).

In schools, terms such as “consultative” “curriculum-based” and “classroom-based” apply a range of service delivery options (Ukrainetz, 2015c). These terms are defined inconsistently across the literature, but cover services such as: SLP and teacher providing joint whole class instruction; SLP providing individualized support to identified children in class whilst the teacher instructs the whole class; SLP providing training or intervention materials for teachers to implement; or SLP providing input into curriculum differentiation for whole classes or individual children (Archibald, 2017; Hemmeter, 2000; Hyter, 2003; Paul & Norbury, 2012c; Schraeder, 2008; Throneburg et al., 2000; Ukrainetz, 2015c). In contemporary school-based literature, SLP services are also often described within a Response-to-Intervention (RTI) model (American Speech and Hearing Association, 2010; Law et al., 2012; Sanger et al., 2012; Speech Pathology Australia, 2014). In this model, intensity of support may increase across three tiers, depending a child's measured response to previous supports and interventions (Archibald, 2017; Haynes & Pindzola, 2012). Tier one services support whole group teaching and curriculum differentiation, tier two services support focused interventions to small groups of identified children and tier three services support individualized interventions (Law et al., 2012; Pullen et al., 2010).

In this taxonomy, interventions are described across three components: method i.e., Delivered by SLP, Delivered by Other or Software-Delivered; Format (i.e., “Tier” of support) and Environmental Context (i.e., clinic or community). Interventions delivered by an SLP or another person may also be identified as face-to-face or ICT delivered.

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Definitions for Aspect Three

Method

Delivered by SLP: Interventions primarily delivered by an SLP. These interventions may involve others as communication partners or include follow-up activities or homework delivered by others; however, the SLP is the primary person providing the intervention for the duration of the intervention block (Boyle et al., 2007).

Delivered by Other: Interventions primarily delivered by other people (e.g., parent, teacher, teacher-aide, other-professional, therapy assistant etc). The role of SLP input is to train or support “others” (Boyle et al., 2007). This may include providing training, giving instructions/advice, providing coaching or supplying intervention materials. The SLP may also conduct intervention with the children for the purpose of modelling or demonstrating to those being trained. The level of SLP input may vary highly depending on the training needs or may vary over time (i.e., the SLP may have high input initially which then reduces as the “other” person becomes trained).

Note: It is acknowledged that significant SLP time may be involved in training “others” and that varied approaches may be used, however it is beyond the scope of this taxonomy to describe methods involved in training others.

Interventions delivered by a person may be:

- **Face-face:** The children and person delivering the intervention are in the same room (American Speech and Hearing Association, 2010).
- **ICT (telehealth):** Intervention is delivered with the assessor and the children communicating through information and communication technologies (ICTs), including videoconferencing, web-conferencing, and telephone (American Speech and Hearing Association, 2010; Molini-Avejonas et al., 2015). Technology that is not used for simultaneous two-way communication between individuals during intervention (e.g., audio/video recorders) is not considered ICT.

Software Delivered: The intervention is predominantly a computerized process (App or web-based program etc) with no (or very limited) input from a person (Knight et al., 2013). The software program selects and presents tasks and gives children feedback. A person may set a child up at a computer or be present as adult supervision; however, the process is predominantly computerized i.e., software program selects and presents tasks, provides feedback to the children and collects data. If a person is required to deliver tasks, provide feedback, or record data, then the intervention is not categorized as software.

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Format

Whole class (RTI Tier 1): Interventions delivered as (and suited for) whole class teaching (i.e., one adult per seven or more children). This may include universal design or techniques for curriculum differentiation (Law et al., 2012; Sanger et al., 2012).

Small group (RTI Tier 2): Interventions delivered as (and suited for) small group teaching (i.e., one adult for two-six children). This may include in-class focused support for small groups of “at-risk” children (Law et al., 2012; Sanger et al., 2012).

Individualized (RTI Tier 3): Interventions delivered to individual children (Law et al., 2012; Sanger et al., 2012).

Environmental Context

Clinical: Skills are learned in a clinical context i.e., intervention does not incorporate materials or communication partners from day-to-day environments (Fey, 1986a; McCauley et al., 2017).

Community:

- **School:** Intervention occurs in a school (or Kindy) context i.e., incorporates communication partners, communication situations and materials that represent a school environment. Other terms used include “curriculum-based” or “classroom-based” intervention (McCauley et al., 2017; Ukrainetz, 2015c).
- **Home:** Intervention occurs in a home context i.e., incorporates communication partners, communication situations and materials that represent a home environment (Fey, 1986a; McCauley et al., 2017; Paul & Roth, 2011).
- **Other:** Intervention occurs in a community context i.e., incorporates communication partners, communication situations and materials that represent a community environment (Fey, 1986a; McCauley et al., 2017; Paul & Roth, 2011).

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Aspect Four (Intervention Form)



Background for Aspect Four

Language interventions may be described by the types of tasks through which intervention occurs (McCauley et al., 2017), although variation exists across literature with regards to the definitions and interpretation of terms (Hepting & Goldstein, 1996). Descriptions relate to the naturalism of the interactions (Eisenberg, 2014; Fey, 1986c, 1986d, 1986e; Gillam et al., 2012; Norris & Hoffman, 1990; Snell et al., 2006; Ukrainetz, 2015b) or hierarchy/structure of the teaching (Helland et al., 2011; Koole et al., 2015; Paesani, 2005; Ukrainetz, 2015b).

In this taxonomy, these distinctions are covered in one component (i.e., task-type). Categories are based on those proposed by Ukrainetz (2015b) with information from other literature considered in relation to the definitions of categories (Gillam et al., 2012; Koole et al., 2015).



Definitions for Aspect Four

Task-Type

Decontextualized – Hierarchical

Other related terms may include “traditional” or “discrete skill” intervention (Gillam et al., 2012; Koole et al., 2015).

Features of these interventions include:

Naturalness

Discrete skills are targeted in highly structured tasks that are selected and directed by the clinician (Damico & Damico, 1997; Fey, 1986e). Intervention sessions typically consist of a series of repetitive, drill-based tasks with minimal topic continuity between tasks (Camarata & Nelson, 1992; Gillam et al., 2012). Games (or motivating items) may be used to make tasks entertaining, however the target skills are not an inherent part of the game (Ukrainetz, 2015b).

Structure

Skills are taught following a set (usually developmental) sequence (i.e., bottom-up or deductive approach), with progress to subsequent tasks dependent on mastery of previously targeted skills (Helland et al., 2011; Paesani, 2005; Ukrainetz, 2015b). Later stages may move towards more contextualized activities for generalization, however intervention begins by teaching skills in decontextualized tasks (this unlike contextualized and activity-focused interventions which occur in naturalistic or real-life activities from the outset (Camarata & Nelson, 1992).

Theoretical background

The underlying theory is that earlier developing skills should be taught first, and skills are mastered in highly structured situations before generalization to everyday communicative contexts (Camarata & Nelson, 1992).

Decontextualized - Non-hierarchical

Other terms may include: “skill-stimulation” (Ukrainetz, 2015b).

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Features of these interventions include:

Naturalness

Same as Decontextualized-Hierarchical (see section above).

Structure

A variety of skills are practiced without a defined teaching sequence or a plan for how skills combine. Intervention does not follow a set developmental or hierarchical sequence (Ukrainetz, 2015b).

Theoretical background

The underlying theory is that practice of language skills stimulates cognitive processing and leads to enhanced overall functioning (Ukrainetz, 2015b).

Contextualized

Features of these interventions include:

Naturalness

Intervention activities are structured and directed by the clinician but occur in meaningful, natural interactions between the children and the clinician (Fey, 1986d). Intervention sessions are centered on a topic (e.g., in a storybook or a conversation) (Camarata & Nelson, 1992); with topic continuity across activities within a teaching session (Gillam et al., 2012).

Structure

Intervention may not be structured according to a hierarchical sequence (i.e., top-down or inductive approach), as the focus is on maintaining a meaningful context (Helland et al., 2011; Paesani, 2005).

Theoretical background

The underlying theory is that skills should be developed in naturalistic and meaningful contexts (Camarata & Nelson, 1992). Discrete skills may be targeted; however these skills remain embedded within a larger communicative purpose, such as telling a story (Ukrainetz, 2015b).

Activity Focused

Features of these interventions include:

Naturalness

Intervention occurs within the child's regular everyday activities or school curriculum, with adults responding to the child's communication by providing scaffolding and supports (Fey, 1986c; Ukrainetz, 2015b). Skills are taught directly within the daily-life activities in which they occur (Hyter, 2003), with focus on the activity being completed, rather than acquisition of discrete skills (Koole et al., 2015). Where skill acquisition occurs, this is directly related to performance on the specific activity being targeted.

Intervention Structure

Intervention targets are selected based on functional need for performance in the activity being targeted, rather than developmental stages (Ukrainetz, 2015b).

Theoretical background

Intervention is directly aimed at improving participation, functional performance or independence with regards to everyday activities (Koole et al., 2015; Westby, 2007).

Aspect Five (Teaching Techniques)



Background for Aspect Five

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Teaching techniques are the ‘active ingredients’ embedded within interventions (Turkstra et al., 2016; Warren et al., 2007). Other similar terms include procedures (McCauley et al., 2017), scaffolding or structural supports (Ukrainetz, 2006a, 2015b), “teaching episodes” or “dose” (Warren et al., 2007). It is acknowledged that language interventions are often comprised of multiple active ingredients and that teaching episodes comprise of both what an SLP does (i.e., inputs) and the child’s response to the techniques (i.e., output) (Baker, 2012). Depending on the goal or skills being targeted, the child’s responses may be verbal or non-verbal (Kamhi, 2014). Successful use of teaching techniques evokes a response from the child (either immediate or over time) and leads to positive therapeutic change.

Intervention techniques may facilitate either explicit or implicit learning (Alt et al., 2012; Ebbels, 2014; Finestack & Fey, 2009; Paesani, 2005). In implicit intervention approaches the child is not made consciously aware of the target form being taught, with the interventions often occurring in naturally occurring games or book reading contexts with the focus on communicative meaning over linguistic form. In explicit intervention approaches, the child is made explicitly aware of the target being taught through specific rules or patterns in teaching tasks designed to engage meta-cognitive skills. These rules are specifically taught prior to the presentation of examples in which the rule is applied (i.e., linguistic form, rather than meaning, is presented first).

In this taxonomy, the descriptive categories described by Ukrainetz (2006b) have been used as a structure to describe techniques that have been identified from literature as those that may be used in language interventions (Beukelman & Mirenda, 2013a, 2013b; Ebbels, 2007; Eisenberg, 2014; Embry & Biglan, 2008; Gillam & Loeb, 2010; Hegde, 2006; Hyter, 2003; Kaderavek, 2015b; Kamhi, 2014; McClintock et al., 2014; Paul & Norbury, 2012c; Proctor-Williams, 2009; Proctor-Williams & Fey, 2007; Reichow & Volkmar, 2010; Rosenshine, 2012; Roth & Paul, 2014; Smith-Lock et al., 2013; Smith-Lock et al., 2015; Snell et al., 2006; Starling et al., 2012; Warren et al., 2007; White et al., 2007). The distinction between explicit and implicit teaching is identified through the types of techniques used in the intervention i.e., presence or absence of explicit instructions (Finestack & Fey, 2009; Smith-Lock et al., 2013).

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Definitions for Aspect Five

Prompting (or response) techniques: Prompts or cues that are intended to elicit an immediate response from a child (Ukrainetz, 2006b). These occur before a “client act” (Baker, 2012; Warren et al., 2007). For example, an SLP may use closed and open-ended questions to elicit 50 productions of past tense verbs from a child in an intervention session. Prompts are repeated (to elicit a target multiple times); are selected depending on a child’s current level of ability; and are reduced (faded) over time to lead to greater independence from the child. The child’s response to prompts may be verbal or non-verbal, depending on the goal being targeted. Prompting techniques are:

- **Time delay (expectant waiting):** Waiting longer than is typical for a desired child response (with no other prompts provided while waiting).
- **Physical (tactile) prompts/cues:** Use of touch to prompt or cue a child to begin or continue a task.
- **Gestural prompts/cues:** Use of gesture or facial expression to elicit a target response.
- **Visual (pictures, symbols or written) prompts/cues:** Use of visual prompts or cues to elicit a target response.
- **Verbal (auditory) prompts/cues:** Use of a verbal prompt or cues to elicit a target response. This may include:
 - **Questions (open or closed):** Use of questions to elicit a targeted response. The format of questions varies depending on the desired response.
 - **Suggestions (direct or indirect):** May be a direct instruction regarding the expected response.
 - **Cloze completion:** Giving a word, sentence, or phrase for the child to complete.
 - **Phonemic prompt:** Use of an initial sound/syllable in a word to prompt production.
- **Model for Imitation:** Specific request/expectation for the child to produce (or imitate) a response (verbal, written, symbolic or gestural) that has been explicitly modeled.

Linguistic techniques: These techniques do not intend to elicit an immediate response from a child but are used repeatedly to highlight the communication skills or linguistic rules being targeted in order to facilitate development over time (Ukrainetz, 2006b). For example, an adult may provide 50 expansions of a child’s utterance in an intervention session to demonstrate Subject-Verb-Object sentence structures. Linguistic techniques are:

- **Model for demonstration:** Deliberate presentation or model of an intervention target, without expectation of immediate response from the child. Demonstrations may be provided by:
 - **Adult modeling** (either in real-time or through videorecording)
 - **Peer modeling** (either in real-time or through videorecording)
 - Note: the presence of peers does not in itself constitute peer-modeling unless the peer has been deliberately primed or placed to provide modeling.
 - **Video modeling (or video feed-forward):** child’s response is recorded and then edited and corrected before playback to child.

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- **Think alouds:** Verbalization of the problem-solving processes or strategies involved in completing a task, such as making predictions, decoding texts, or summarizing information.
- **Focused contrast:** Deliberate comparing of incorrect response with a correct response.
- **Inflectional model (for demonstration):** Demonstrational models in which deliberate stress is given to a target.
- **Recasts/expansions:** Immediate repetition of the child's utterance with correction or modification of a target whilst maintaining the word order and core meaning of the utterance.
- **Extensions:** Immediate response to child's utterance by the adding one or more linguistic forms to expand the complexity or meaning of the utterance.

Regulatory techniques: These techniques have functions of facilitating the child's understanding of the goal or skill being targeted; assisting with maintaining focus to learning tasks; or assisting the child to self-monitor (Ukrainetz, 2006b). Regulatory techniques do not intend to elicit an immediate response from a child or demonstrate a specific communication skill or linguistic rule. They may not be directly counted in "dose", however may be considered important techniques for achieving intervention outcome. Regulatory techniques are:

- **Explicit instructions:** Explicit instructions regarding the use of target forms, such as linguistic rules or social expectations are provided. Instructions may be provided as:
 - **Verbal (explicit) instructions:** Verbal information is provided to make the child explicitly aware of the linguistic rules or features being taught.
 - **Visual (explicit) instructions:** Visual materials are used to explicitly explain the linguistic rules or features being taught.
- **Relating new content to past knowledge:** Commenting on links or similarities between tasks or skills.
- **Explanation of goals or expectations:** Learning intentions, goals or task expectations are described in an age-appropriate manner. Note: this is different to the technique "explicit instructions" (described above), because the explanations are about intervention goals or expectations rather than the communication rules/features being targeted. Goals or expectations may be provided as:
 - **Verbal explanation:** Verbal information is provided to explain goals or expectations.
 - **Visual explanation:** Visual information is provided to explain goals or expectations.
- **Feedback:** The purpose of feedback is to provide the child with specific information on their performance (strengths and weaknesses) in relation to the intervention target. Feedback is intentional, specific to the goal being targeted and provided immediately (or as soon as practicable) after the child's performance. Feedback may be provided as:
 - **Verbal feedback:** Child gets verbal information regarding their response or performance.
 - **Visual feedback:** Child gets visual information regarding their response or performance.
 - **Repetition as feedback:** Child's own response is repeated as a means of encouraging the child to correct their response. Repetition may be provided by an adult or may be a recording of the child's response played back.
 - **Natural consequence:** Feedback received through natural consequence in an interaction.

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- **Rewards:** Rewards (positive reinforcement) provided for the purpose of keeping the child motivated or interested. Rewards include in-tangible reinforcement or tangible reinforcement. Natural consequences are not identified twice as also being rewards (e.g., receiving a desired item that was successfully requested is identified as a natural consequence rather than a reward); however, rewards may be provided in addition to a natural consequence (e.g., receiving a desired item and also getting a sticker to place on a chart).

Note: Although verbal praise, encouragements, and positive affirmations are also rewarding; they are not included here. This is because these positive interactions are considered to have a place in all interventions (either with or without other rewards or feedback) and are thus not a feature that distinguishes some interventions from others.

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Supplemental Materials 2

Survey questions for each Delphi round

ROUND ONE

SECTION 1 Consent

Q1.1. I consent to complete an online survey and for my responses to be used for the purposes described above.

Yes/No response. If no, skip to end of survey.

SECTION 2 Eligibility

The following questions ask you to confirm your eligibility to participate in this study.

If you have questions, then please email: deborah.denman@postgrad.curtin.edu.au.

Q2.1 Do you have (or are eligible for) certified practicing membership with Speech Pathology Australia?

Yes/No response. If no, skip to end of survey.

Q2.2 Have you spent more than 5 years (full-time equivalent) in the last 10 years engaged in assessment, intervention, education, or research activities related to students aged 4-18 years with language disorder?

For this study:

‘Students with language disorder’ refers to children and adolescents with oral or written language support needs (i.e., semantics, syntax, morphology, phonology, discourse, or pragmatics) regardless of primary diagnosis, severity, aetiology, or other co-morbidities associated with the language support needs. The focus of this study is mono-lingual English-speaking students.

‘Activities’ include:

- a) Provision of clinical services (where approximately 50% or more of caseload is students aged 4-18 years with language disorder).
- b) Research (where approximately 50% or more of research activities relate to students aged 4-18 years with language disorder).
- c) Professional supervision/support, academic teaching, resource development or consultancy (where approximately 50% or more of professional activities relate to services for children aged 4-18 years with language disorder).
- d) Combination of the above.

Yes/No response. If no, skip to end of survey.

SECTION 3 Demographics

The purpose of the following questions is to gather information on the demographics of the experts participating in the Delphi Study.

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Q3.1. Please indicate the option(s) that best describe the sector(s) in which you are currently employed as a speech pathologist (or in other work related to child language development or education). Select a maximum of 2 options.

Multiple choice response with open text box for 'other' responses

Q3.2. Please indicate your (completed) qualifications. Note: It is not necessary to indicate qualifications that are unrelated to speech pathology, child development or education.

Multiple choice response with open text box for 'other' responses.

Q3.3. Please indicate the number of years in total (full-time equivalent) that you have worked as a speech pathologist (or in other employment related to child language development or education).

Multiple choice response.

SECTION 4 Taxonomy agreement and intervention categorisation

For the remaining questions on this survey, you will need to refer to the document in the following link: Delphi Study Reference Sheet.

Remember that you are able to leave this survey (multiple times) and come back later to where you left off, as long as you use the same computer and same web-browser each time. You do not have to click a 'save' button, just close the survey window, and use the link to open the survey up again later. Before proceeding, please read the background information and overview of the taxonomy on pages 1-8 of the Delphi Study Reference Sheet.

Aspect One

Please refer to the document titled: Delphi Study Reference Sheet. Consider the information presented regarding the structure of Aspect I-A & I-B (Language Domain) on pages 9-11.

[Screenshot of Aspect I from taxonomy flowchart included here]

This aspect is the same for both assessment and intervention. The categories in this aspect are not mutually exclusive (i.e., assessments and interventions may target multiple domains).

Q4.1 Overall, the structure of Aspect I seems useful for describing the broad target areas for spoken language assessments and interventions for school aged children.

Five-point Likert scale response i.e., 'Strongly agree', 'Agree', 'Neither agree or disagree', 'Disagree', 'Strongly Disagree'. If 'Strongly agree' or 'Agree' is not selected, then the next question is displayed.

Q4.2. Please indicate what changes you would make to the structure of Aspect I (Language Domain) and where possible, provide references or reasoning.

Open text box.

Q4.3 Do you agree with the definitions provided for the components of Aspect I (Language Domain)?

Five-point Likert scale response i.e., 'Strongly agree', 'Agree', 'Neither agree or disagree', 'Disagree', 'Strongly Disagree'. If 'Strongly agree' or 'Agree' is not selected, then the next question is displayed.

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Q4.4. Please indicate what changes you would make to the definitions for Aspect I (Language Domain) and where possible, provide references.

Open text box.

To examine the usefulness of the proposed taxonomy for classifying interventions in a meaningful and consistent way, you are now asked to consider the following interventions and how they would be categorized according to the taxonomy in its current form.

To ensure that the Delphi Study participants all have the same understanding of each intervention, please click on the intervention names below and read the half page summaries before categorising the intervention (note: we do ask that you read the extra information in these links).

Active Listening for Active Learning (Johnson & Player, 2009)

Shape Coding Intervention (Ebbels, 2007)

Picture Exchange Communication System PECS (Bondy & Frost, 1994)

Robust Tier Two Vocabulary Instruction (Beck et al., 2002)

If you do not feel that you know a particular intervention well enough to categorize it, then click in column one ('unfamiliar') for that particular intervention and do not complete other columns.

If you are familiar with the intervention, then leave column one blank and select answers from the other columns. Refer to the information in the 'Delphi Study Reference Sheet' pages 10-11 when categorising. If unsure about any answers, then try to select the option/s that you think best fit.

Q4.5 Please categorize Active Listening for Active Learning (Johnson & Player, 2009) according to Aspect I (Intervention Language Domain) of the proposed taxonomy.

Multiple choice response: 'unfamiliar', 'spoken', 'written', 'comprehension', 'production', 'semantics', 'morphosyntax', 'social abilities', 'discourse', 'meta-abilities', 'executive functioning'.

Q4.6 Please categorize Shape Coding Intervention (Ebbels, 2007) according to Aspect I (Intervention Language Domain) of the proposed taxonomy.

Multiple choice response: 'unfamiliar', 'spoken', 'written', 'comprehension', 'production', 'semantics', 'morphosyntax', 'social abilities', 'discourse', 'meta-abilities', 'executive functioning'.

Q4.6 Please categorize Picture Exchange Communication System PECS (Bondy & Frost, 1994) according to Aspect I (Intervention Language Domain) of the proposed taxonomy.

Multiple choice response: 'unfamiliar', 'spoken', 'written', 'comprehension', 'production', 'semantics', 'morphosyntax', 'social abilities', 'discourse', 'meta-abilities', 'executive functioning'.

Q4.6 Please categorize Robust Tier Two Vocabulary Instruction (Beck et al., 2002) according to Aspect I (Intervention Language Domain) of the proposed taxonomy.

Multiple choice response: 'unfamiliar', 'spoken', 'written', 'comprehension', 'production', 'semantics', 'morphosyntax', 'social abilities', 'discourse', 'meta-abilities', 'executive functioning'.

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Q.4.7 If you have any comments about Aspect I (Intervention Domain) or the categorisation of interventions within this aspect, please comment here.

Open text box

[Questions 4.1-4.7 repeated for taxonomy Aspects II, III, IV and IV. Screenshots of the flowchart are provided and any instructions specific to particular Aspects are provided with survey questions]

SECTION 5 Overall Agreement

You are now asked your opinion on the overall structure of the taxonomy (i.e., number of aspects and sequence or layout of aspects). Refer to the document titled Delphi Study Reference Sheet, pages 5-8.

Q5.1 The overall structure of the taxonomy seems useful for describing assessments and interventions for school aged children.

Five-point Likert scale response i.e., 'Strongly agree', 'Agree', 'Neither agree or disagree', 'Disagree', 'Strongly Disagree'. If 'Strongly agree' or 'Agree' is not selected, then next question is displayed.

Q5.2. Please comment on what you would add, remove, or change with regards to the overall structure of the taxonomy. Where possible, provide references or reasoning.

Open text box

SECTION 6 Other Comments

Q5.3 Do you have any other comments or feedback regarding this proposed taxonomy that have not been provided elsewhere? If so, please write here.

Open text box

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ROUND TWO

SECTION 1 Consent

Q1.1. I consent to complete an online survey and for my responses to be used for the purposes described above.

Yes/No response. If no, skip to end of survey.

SECTION 2 Eligibility

Only participants who completed round one (i.e., progressed to the last page with the statement ‘Thank-you for completing this survey’) are able to complete round two. This is because the content of round two requires participants to have the background information from round one.

If you have any questions about your participation, then please email:
deborah.denman@postgrad.curtin.edu.au

Q2.1 Did you complete the Round One survey in this Delphi Study?

Yes/No response. If no, skip to end of survey.

SECTION 3 Demographics and email

The purpose of the following questions is to gather information on the demographics of the experts participating in the Delphi Study.

Q3.1. Please indicate the option(s) that best describe the sector(s) in which you are currently employed as a speech pathologist (or in other work related to child language development or education). Select a maximum of 2 options.

Multiple choice response with open text box for ‘other’ responses.

Q3.2. Please indicate your (completed) qualifications. Note: It is not necessary to indicate qualifications that are unrelated to speech pathology, child development or education.

Multiple choice response with open text box for ‘other’ responses.

Q3.3. Please indicate the number of years in total (full-time equivalent) that you have worked as a speech pathologist (or in other employment related to child language development or education).

Multiple choice response.

The following question asks you to provide your email address. This question is optional. The reasons you are asked for your email address include:

1. To allow individual participants to be accurately tracked between round two and round three for calculation of stability (i.e., change) in level of agreement between rounds. If participant responses remain highly stable (i.e., similar) between rounds, this will add strength to the level of consensus.

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2. To allow us to contact participants individually if need arises e.g., provide individualized feedback to participants on their responses in relation to group responses, if it is felt that this will be beneficial with obtaining agreement in the final round.

If you provide your email address, the identity of your responses will be visible to supervising investigators who export the data from the survey software and de-identify it for data analysis. As the demographic questions are the same across rounds, this may also make your round one responses more easily identifiable to you. Your identity will not be known to anyone else, including the student researcher who will be blinded to the identity of participant responses when analyzing comments.

If you do not provide your email address, then your responses will remain unattached to your identity.

Q3.4 Please provide your email address here:

Open text response.

SECTION 4 Taxonomy Agreement

Please open the document in this link: Delphi Study Feedback Sheet R2

This document summarizes the results of round one and explains the content of round two. Whilst you do not have to read all the details in the tables, it is important that you understand the findings from round one and the aims of round two.

Now, please open the document in this link: Delphi Study Reference Sheet v2.

You will need to refer to this document whilst completing the questions in this survey. This document is the same as the document for Round One, with changes/additions indicated in red font. You do not have to read this entire document; however, you do need to read and consider the changes indicated in red font.

Remember that you are able to leave this survey (multiple times) and come back later to where you left off, as long as you use the same computer and same web-browser each time. You do not have to click a 'save' button, just close the survey window and use the link to open the survey up again later.

Aspect One

Please refer to the document in the link: Delphi Study Reference Sheet v2. Consider the information presented regarding the structure of Aspect I-A & I-B (Modalities/Domains) on pages 9-11.

[Screenshot of Aspect I from taxonomy flowchart included here]

This aspect is the same for both assessment and intervention. The categories in this aspect are not mutually exclusive (i.e., assessments and interventions may target multiple domains); however, categorisation is based on the modalities/domains that are primarily measured or targeted in the assessment or intervention.

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Q4.1 Overall, the structure of Aspect I seems useful for describing the broad target areas for spoken language assessments and interventions for school aged children.

Five-point Likert scale response i.e., 'Strongly agree', 'Agree', 'Neither agree or disagree', 'Disagree', 'Strongly Disagree'. If 'Strongly agree' or 'Agree' is not selected, then next the question is displayed.

Q4.2. Please indicate what changes you would make to the structure of Aspect I (Language Domain) and where possible, provide references or reasoning.

Open text box.

Q4.3 Do you agree with the definitions provided for the components of Aspect I (Language Domain)?

Five-point Likert scale response i.e., 'Strongly agree', 'Agree', 'Neither agree or disagree', 'Disagree', 'Strongly Disagree'. If 'Strongly agree' or 'Agree' is not selected then the next question is displayed

Q4.4. Please indicate what changes you would make to the definitions for Aspect I (Language Domain) and where possible, provide references.

Open text box.

[Questions 4.1-4.4 repeated for taxonomy Aspects II, III, IV and IV. Screenshots of the flowchart are provided and any instructions specific to particular Aspects are provided with survey questions]

SECTION 5 Overall Agreement

You are now asked your opinion on the overall structure of the taxonomy (i.e., number of aspects and sequence or layout of aspects). Refer to the document titled Delphi Study Reference Sheet, pages 5-8.

Q5.1 The overall structure of the taxonomy seems useful for describing assessments and interventions for school aged children.

Five-point Likert scale response i.e., 'Strongly agree', 'Agree', 'Neither agree or disagree', 'Disagree', 'Strongly Disagree'. If 'Strongly agree' or 'Agree' is not selected, then the next question is displayed.

Q5.2. Please comment on what you would add, remove, or change with regards to the overall structure of the taxonomy. Where possible, provide references or reasoning.

Open text box.

Q5.3 Do you have any other comments or feedback regarding this proposed taxonomy that have not been provided elsewhere? If so, please write here.

Open text box.

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SECTION 6 Intervention categorisation

You are now asked to consider two case studies, each describing language interventions that may occur for school-aged students. You will be asked to describe the intervention in each case study according to the proposed taxonomy.

You do not need to be familiar with the intervention approaches in order to complete the questions. In fact, we ask that you do not consider information that is not given in the case study. The purpose is to determine if language experts apply the taxonomy in the same way when categorising based on the same information. Even if you think of different ways that these intervention approaches could be conducted; or even if you conduct these approaches differently yourself, please only categorize based on how the intervention is conducted in the case study.

Note: These case studies were created for the purposes of the Delphi Study. They have been kept succinct (for the ease of Delphi Study participants) and are not intended to be fully comprehensive descriptions of an intervention process. They are not intended to be examples of 'recommended practice' nor are they intended to represent how interventions are most frequently delivered in SLP practice.

Please describe the following interventions according to Aspect I (Intervention Domain) of the proposed taxonomy.

When answering, refer to the Delphi Study Reference Sheet v2, pages 10-11.

Click on the links below to open the intervention case studies:

Case study one - Intervention for Meg (PECS)

Case study two - Year 8 Science (Vocabulary)

Remember to only describe the interventions as they are used in the case studies (not as they may be used elsewhere)

Note: If you accidentally select an answer you don't want, you may uncheck it by clicking again.

Q6.1 Please categorize Case study One - Intervention with Meg

Multiple choice response: 'spoken', 'written', 'comprehension', 'production', 'semantics', 'morphosyntax', 'social abilities', 'discourse', 'meta-abilities', 'executive functioning'.

Q6.2 Please categorize Case study two - Year 8 Science

Multiple choice response: 'spoken', 'written', 'comprehension', 'production', 'semantics', 'morphosyntax', 'social abilities', 'discourse', 'meta-abilities', 'executive functioning'.

[Questions 6.1 and 6.2 repeated for taxonomy Aspects II, III, IV and V. Any instructions specific to particular Aspects are provided with survey questions]

SECTION 7 Other comments

If you have any comments about the taxonomy for describing interventions (either the interventions in the case studies or other interventions), then please comment here.

Open text response.

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ROUND THREE

Q1.1. I consent to complete an online survey and for my responses to be used for the purposes described above.

Yes/No response. If no, skip to end of survey.

SECTION 2 Eligibility

Only participants who completed round two (i.e., progressed to the last page with the statement ‘Thank-you for completing this survey’) are able to complete round three.

If you have any questions about your participation, then please email:
deborah.denman@postgrad.curtin.edu.au

Q2.1 Did you complete the round two survey in this Delphi Study?

Yes/No response. If no, skip to end of survey.

SECTION 3 Demographics and email

The purpose of the following questions is to gather information on the demographics of the experts participating in the Delphi Study.

Q3.1. Please indicate the option(s) that best describe the sector(s) in which you are currently employed as a speech pathologist (or in other work related to child language development or education). Select a maximum of 2 options.

Multiple choice response with open text box for ‘other’ responses

Q3.2. Please indicate your (completed) qualifications. Note: It is not necessary to indicate qualifications that are unrelated to speech pathology, child development or education.

Multiple choice response with open text box for ‘other’ responses

Q3.3. Please indicate the number of years in total (full-time equivalent) that you have worked as a speech pathologist (or in other employment related to child language development or education).

Multiple choice response

The following question asks you to provide your email address. This question is optional. The reasons you are asked for your email address include:

1. To allow individual participants to be accurately tracked across rounds for calculation of stability (i.e., change) in level of agreement between rounds.

2. To allow us to contact participants individually if need arises

If you provide your email address, the identity of your responses will be visible to supervising investigators who export the data from the survey software and de-identify it for data analysis. As the demographic questions are the same across rounds, this may also make your round one responses more easily identifiable to you. Your identity will not be known to

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anyone else, including the student researcher who will be blinded to the identity of participant responses when analyzing comments.

If you do not provide your email address, then your responses will remain unattached to your identity.

Q3.4 Please provide your email address here:

Open text response

SECTION 4 Taxonomy Agreement

Round Two Results

Taxonomy structure and definitions:

In both rounds one and two, agreement was reached with regards to the structure and definitions of the taxonomy. In round two, at least 88% of participants selected 'strongly agree' or 'agree' for each aspect of the taxonomy and 100% of participants 'strongly agreed' or 'agreed' with the overall structure of the taxonomy. No participants selected 'strongly disagree' for any aspect. Given the high consensus across repeated rounds, it is confirmed that expert consensus has been reached on the structure of, and definitions within, the taxonomy.

Application of taxonomy for describing assessments and interventions:

In round two, agreement was reached with regards to the categorisation of assessment and intervention case studies on some aspects of the taxonomy, but not on other aspects. The aspects that lacked consensus in round two were mostly the same aspects that lacked consensus in round one. This indicates that, although expert consensus was reached with regards to the structure of the taxonomy, there are aspects of the taxonomy that are challenging to apply when describing assessments and interventions. This may be due to lack of clarity within the taxonomy; or may be due to issues outside of the taxonomy that influence how SLPs describe different assessments and interventions.

In round three, components where agreement was not reached are further explored. Participants are asked to reconsider the same case studies from round two; categorize the case studies on the components that did not reach agreement; and then consider the reasons why consensus may be more difficult for these particular components or particular case studies.

If you wish to see further details of the round two results, please view the document in the following link: Round Two Participant Feedback Sheet

The structure and definitions of the taxonomy are the same as round two, with two exceptions:

1. Extra examples and/or clarifying statements were added to some components to assist with application of the taxonomy. These additions are included in the questions in this survey, or you may wish to look at the Participant Reference Sheet in the following link: Participant Reference Sheet v3
2. The aspect I-A & I-B categories 'Social Abilities' and 'Discourse' were merged into a single category called 'Social-Abilities & Discourse'. This change was made to address difficulties in

Denman, Kim, Munro, Speyer & Cordier (2021) *Consensus on Terminology for Describing Child Language Interventions: A Delphi Study*.

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defining two distinctive, mutually exclusive categories (i.e., to address overlap between the two categories). The definitions within these categories are largely unchanged; however, as this is structural change to the taxonomy, participants are asked to indicate their level of agreement with the merger (see below).

[Definition for 'social abilities and discourse' included here]

Q4.1 Please indicate your level of agreement with the merged category 'Social-Abilities & Discourse'.

Five-point Likert scale response i.e., 'Strongly agree', 'Agree', 'Neither agree or disagree', 'Disagree', 'Strongly Disagree'. If 'Strongly agree' or 'Agree' is not selected, then next question is displayed.

Q4.4. Please indicate why you do not agree with the category 'Social Abilities & Discourse':

Two choice answer:

'I prefer the two separate categories of Social Abilities and Discourse (i.e., as they were in round two').

'Other reason. Please specify' with open text response.

SECTION 5 Intervention Categorisation

The last part of the survey asks you categorize the same intervention case studies from round two (with only very minor adjustments if any) on the categories that were not agreed upon in round two.

As per round two, you do not need to be familiar with the interventions in the case studies in order to describe them using the taxonomy. The purpose is to determine if language experts apply the taxonomy in the same way when categorising from the same information. Therefore, even if you think of different ways that the interventions could be conducted; or even if you conduct these interventions differently yourself, it is important that you only categorize based on how the intervention is conducted in the case study.

Note: These case studies were created for the purpose of this Delphi Study. They are not intended to be examples of 'recommended practice' nor are they intended to represent how interventions are most frequently used in SLP practice.

Links for case studies:

Case study one: Intervention for Meg (PECS)

Case study two: Year 8 Science (Vocabulary)

Read the case studies and the category definitions provided in the tables below, then answer the questions.

If you wish to see the reference list, or read the background information for any of the definitions, then please refer to the Participant Reference Sheet v3

Should you accidentally select a survey answer that you don't want, you may uncheck it by selecting the answer that you do want.

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Aspect I

Case Study One: Intervention for Meg

In round two, participants:

Agreed that 'Spoken Language', 'Production' and 'Social-Abilities/Discourse' apply to this intervention.

Agreed that 'Written Language', 'Syntax', 'Meta-Abilities' and 'Executive Functions' do not apply to this intervention.

Note: Interventions are described by the specific modalities and domains that are targeted i.e., the modalities and domains specifically addressed in goals for the immediate therapy block and measured as an intervention outcome.

Participants were not in agreement with regards to 'Semantics' and 'Comprehension'. Definitions for these two categories are in the table below (if you wish to read background and references, please see the Participant Reference Sheet v3: pages 9-12)

[Definitions included here]

Q5.1 Please indicate if you think one of these categories describes case study 3:

Multiple choice response: semantics, comprehension, none of these. Participants could both select 'semantics', and 'comprehension' as these are from different components and are not mutually exclusive; however, participants could not select 'none of these' and another response.

Q5.2 If the components 'Comprehension' and 'Semantics' do not reach consensus for case study one (intervention for Meg) during round three, what do you think would be the reason?

Multiple choice answer. Participants could select one of the following responses:

There is overlap between categories, which makes categorisation difficult. If so, please indicate which categories overlap – open response box provided.

Category definition/s lack clarity or may be open to misinterpretation. If so, please indicate which definitions are unclear – open response box provided.

Category name/s are used differently in other literature which may cause misinterpretation when applying this taxonomy. If so, please indicate which category name/s are open to misinterpretation – open response box provided.

The case study lacks information needed to categorize. If so, please indicate what information is lacking – open response box provided.

Don't know why there is lack of consensus for these components.

Other reason. Please specify – open response box provided.

Case study Two: Year 8 Science

In round two, participants:

Agreed that 'Spoken Language', 'Written language', 'Comprehension', 'Production' and 'Semantics' apply to this intervention.

Agreed that 'Executive Functions' does not apply to this intervention.

Note: Interventions are described by the specific modalities and domains that are targeted i.e., the modalities and domains specifically addressed in goals for the immediate therapy block and targeted as an intervention outcome.

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Participants were not in agreement with regards to ‘Morphosyntax’, ‘Social Abilities/Discourse’, and ‘Meta-Abilities’. Definitions for these categories are provided below (for background and references, please see the Participant Reference Sheet v3: pages 9-12):

[Definitions included here]

Q5.3 Please indicate if you think one of these categories describes case study two.

Multiple choice response: ‘morphosyntax’, ‘social abilities/discourse’, ‘meta-abilities’, ‘none of these’. Participants could both select ‘morphosyntax’, ‘social abilities/discourse’, ‘meta-abilities’ as these are not mutually exclusive; however, participants could not select ‘none of these’ and another response.

Q5.4 If the components ‘Morphosyntax’ and ‘Social Abilities & Discourse’ and ‘Meta-Abilities’ do not reach consensus for case study two (Year 8 Science) during round three, what do you think would be the reason? (select one answer)

Multiple choice answer. Participants could select one of the following responses:

There is overlap between categories, which makes categorisation difficult. If so, please indicate which categories overlap – open response box provided.

Category definition/s lack clarity or may be open to misinterpretation. If so, please indicate which definitions are unclear – open response box provided.

Category name/s are used differently in other literature which may cause misinterpretation when applying this taxonomy. If so, please indicate which category name/s are open to misinterpretation – open response box provided.

The case study lacks information needed to categorize. If so, please indicate what information is lacking – open response box provided.

Don't know why there is lack of consensus for these components.

Other reason. Please specify – open response box provided.

[Questions 5.1-5.4 repeated for categories in Aspects II, III, IV and IV that did not reach consensus in round two. Relevant definitions are provided and any instructions specific to particular Aspects are provided with survey questions]

SECTION 6 Final comments

Q6.1 If you have any other comments or feedback regarding the taxonomy for describing interventions (either the case studies or other interventions), then please comment.

Open response box.

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Intervention Case Study 1

Student's name	Meg
Student's Age	4;10 years
Background information	<p>Currently speech is limited to delayed echolalia. Predominantly, functional communication is through facial expression and body language. Meg will sometimes point to and name familiar objects (e.g., favourite characters from TV shows) and appears to recognise pictures of familiar objects by facial expression or by sometimes naming an item.</p> <p>Meg does not name items or point to indicate wants or needs. At home she will go to items she wants or take an item she wants when it is offered to her. Meg rarely initiates interactions appropriately with others. She displays tantrum behaviours, which appear communicative, given Meg's lack of ability to communicate in more appropriate ways.</p> <p>Intervention will target requesting items and actions using symbolic communication. This will begin in structured communicative situations.</p>

Use the information below to describe the intervention with Meg using the proposed taxonomy

Strategies/ Approaches

Meg learns to request items by exchanging a picture of the favoured item with her mother. Intervention is conducted following the teaching phases in the "Picture Exchange Communication" intervention approach (Bondy & Frost, 1994).

The SLP plans the intervention, decides on the tasks for each week and provides direction to parents regarding tasks to be implemented at home. During intervention sessions, Meg's mother acts as a communication partner, with the SLP providing prompting. Meg's mother brings favoured items from home (identified from parent interview) to use in the intervention sessions. These items include: M&M's, Cheezels, a musical toy train and a jack-in-the-box with sound.

Service Provision

Meg and her mother attend appointments in SLP clinic for a block of intervention sessions.
Dose: at least 30 picture exchanges (requests) each clinic session
Dose frequency: 1 x 45 minute session per week, with parent providing additional practice at home in later stages of intervention
Dose duration: 3 months (approx 12 clinic sessions)

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Intervention block goal/s and measurements:

Intervention block goal:

Meg will be able to make requests to parents at home for desired objects or actions, independently (through picture exchange and/or speech), on 80% or more of occasions when Meg appears (from body language) to want the items.

Intervention measurements:

The SLP records the level of independence with request making during the weekly intervention sessions (i.e. number of requests, level of independence with requests).

Later half intervention block:

Parents monitor progress using a chart regarding frequency and types of request making at home (i.e. types of items requested, number of requests made using speech or picture exchange, level of independence with picture exchange). Parents also use a chart to record frequency and types of tantrum behaviours at home.

Intervention Techniques

Step 1:

Goal: Meg will be able to use a picture card to request a desired item with no physical prompting 80% of the time in the clinic. Note: on occasions when she appears (from body language) to want the items.

Only one preferred item is presented at a time (with other items out of sight). Meg has a picture card for the preferred item stuck to a binder-book with Velcro (only one picture present). The book is placed close to Meg and her mother who is the communication partner. The SLP acts as the prompter.

Teaching episode:

- *Parent:* Holds or shows the desired item.
- *Meg:* Show interest in (or reaches for) the item.
- *Parent:* Holds out hand but does not say anything.
- *SLP:* Directs Meg to take picture card off binder and place in parent's hand. The SLP provides the minimal amount of prompting needed to facilitate the exchange. Prompts include (1) hand-over-hand assistance to hold card in fingers and move arm to exchange (2) assistance to move arm after Meg selects card and (3) light touch to prompt Meg to select card.
- *Parent:* Takes card, hands Meg the item and says the name of the item e.g., "*Cheezel*" or "*You wanted the Cheezel*".

This process continues with the aim of achieving at least 30 exchanges in a 45 minute session.

Step 2:

Goal: Meg will be able cross the room to exchange a picture card to request a desired item with no physical prompting 80% of the time in the clinic. Note: on occasions when she appears (from body language) to want the items.

Only one preferred item is presented at a time (with other items out of sight). Meg has a picture card for the preferred item stuck to a binder-book with Velcro (only one picture). However, in stage 2, the binder-book is placed a distance away from both Meg and the parent who acts as the communication partner (with location gradually moved further away as Meg progresses through stage 2). The SLP acts as prompter in the process.

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Teaching Episode:

- *Parent*: Holds or shows the desired item.
- *Meg*: Shows interest (or reaches for) item.
- *Parent*: Holds out hand but does not say anything.
- *SLP*: Directs Meg to move towards the binder-book and take picture card off the binder and place in parent's hand. The SLP provides the minimal amount of prompting needed to facilitate the exchange. (Prompts include physical prompt to move in direction of book, light touch to prompt Meg to select card)
- *Parent*: takes card, hands the item and says the name of the item e.g., "Train" or "You have the train"

Step 3:

Goal: Meg will be able to exchange a picture card to request a desired item from a choice of two cards with no physical prompting on 80% of the time in the clinic. Note: on occasions when she appears (from body language) to want the items.

Only one preferred item is presented at a time (with other items out of sight), however there is also a non-preferred item (i.e. an item that Meg does not like). Meg has two pictures stuck to the binder - one picture for the preferred item being requested and one picture for a non-preferred item. The binder-book is placed a distance away from Meg and the parent who acts as the communication partner. If required, the SLP acts as prompter.

Teaching episode:

- *Meg*: Shows interest in item.
- *Parent*: Does not say anything. Holds out hand to provide prompting if needed.
- *Meg*: Takes picture card and gives to parent (SLP may provide prompting with light touch if required). If Meg gives card for preferred item, parent gives preferred item with verbal affirmation i.e. "Good choice". If Meg gives card for non-preferred item, parent gives item and says nothing. Parent then holds or shows preferred item again to encourage exchange of correct picture for the desired item.

Step 4:

Goal: Meg will be able to make requests to a communication partner at home for desired objects or actions independently (through picture exchange and/or speech).

In this step, the number of pictures in the binder book increases, as Meg learns to select the appropriate picture from a group of pictures for what she wants, using the same teaching episodes as step 3. Choice-making will also be introduced i.e. a number of preferred items are visible and Meg exchanges a card to make a choice of which one she wants.

Meg also begins using the binder-book at home as well as in clinic sessions. Parents begin by replicating the teaching episodes from clinic sessions with the same motivating items. As Meg begins to use picture exchange at home, other pictures for items that Meg may wish to request at home are added to the book, and parents set up situations at home where Meg is expected to request items (e.g., putting desired items in sight but out of reach).

References:

Bondy, A., & Frost, L. (1994). The picture exchange communication system. *Focus on Autistic Behavior*, 16, 123-128.

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Intervention Case Study 2

Class	Year 8 Science
Age	12-13 years
Summary of existing information	There are a high number of students at Hogwarts School with “at risk” backgrounds or previously identified language difficulties. The year 8 cohort is 80 students divided into three science classes taught by two different science teachers. After term one, the science teachers analyse written science/lab reports and written short answer exam questions. The teachers note, that at a whole cohort level, difficulties with language understanding and expression impacts on the quality of students’ written work. For example, the use of non-specific or general words (e.g., “We <i>did</i> an experiment...” instead of “An experiment was <i>conducted</i> ...”) or incorrect use of words (e.g., “A hypothesis was analysed before the experiment...” instead of “A hypothesis was formulated before the experiment...”).

Use the information below to describe the intervention with the Science Class using the proposed taxonomy

Strategies/Approaches

The school requests SLP support to assist in developing a teaching plan for improving vocabulary within classroom lessons. The SLP assists the two science teachers and the learning-support teacher to further analyse work samples and identify the words to target. The “Robust Tier Two Vocabulary Instruction” approach (Beck, McKeown, & Kucan, 2002; Beck, McKeown, & Kucan, 2013) is used to select the words and guide the teaching. The target words are “Tier two” academic words that occur frequently across all science curriculum units (as opposed to subject specific words which are defined in science textbooks and only relevant to specific units of work); and were identified as words that a large number of students experience difficulty with. Examples of target words include conduct, formulate, classify, specify, analyse, calculate, investigate, compare etc.

The SLP provides training to the teachers regarding vocabulary teaching techniques. The science teachers implement techniques in regular science lessons over terms 2 and 3. The SLP meets with teachers on several other occasions over the year to provide follow-up training and to assist with data analysis. Students who are still identified as having difficulties at the end of term 3 are selected for more intensive small group instruction with the learning support teacher in term 4.

Service Provision

There are three 45-minute science classes per week. The teachers aim to target three target words per week during science classes, with some follow-up each week on previously targeted words.

Dose: students will be exposed to a minimum of 10 models of each target word in a sentence per class (and have a number of opportunities to produce target words in appropriate contexts)

Dose frequency: 3 x 45 minute science classes per week

Dose duration: Two terms

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Therapy Block Goal/s:

Goal:

To improve the quality and clarity of science report writing by increasing the frequency of correct use of “Tier Two” words.

Intervention measurements:

Teachers will keep data (as they mark regular written assignments/lab reports) on the number of times the targeted words are correctly versus incorrectly used by students in written work (term one work is used as baseline data). Samples of written work from students not at a sound level of achievement will also be compared across terms 1-3, with regards to the rubric (marking criteria) for written expression in science reports.

Intervention Techniques

In the first class of the week, the teacher introduces the three target words and explains that these three words will be a focus of learning for the week and that students are expected to use these words in science reports.

The teacher:

- Gives a description or explanation of the word e.g., *“Formulate means to ‘create something very specific or precise’”*.
- Explains how the word may relate to other words the students already know by giving synonyms or antonyms.
- Demonstrates to the students how the target words are spelled by writing them on a whiteboard.
- Gives examples of how the words may be used in a sentence, using examples that are directly relevant to the content that students will be talking and writing about in class e.g., *“Today we are going to formulate a hypothesis about the types of plants that were found in gardens around this area”*.

Students then complete tasks using the three new words (no more than 10 minutes in total for all tasks). This includes:

- Pairing the words with a word that goes with them e.g., which word would make sense with ‘conduct’: ‘experiment’, ‘insect’ or ‘hypothesis’ (completed on a worksheet i.e., draw a line between the words that match).
- A cloze completion activity e.g., *“The scientist classified the _____”* (completed on a worksheet i.e., write in the correct word from a choice of the three target words).
- Taking turns in pairs (by turning to person next to them) saying a sentence with the target words.

During the tasks, the teacher circles the room and gives feedback e.g., *“Yes, those words go together”* or *“That doesn’t look right – try again”*. Students who do not complete the worksheet in class are asked to complete it for homework.

In the remainder of the regular science class, the teacher encourages the students to use the words they have learned in appropriate contexts. For example, in a class activity involving an examination of plants found outside, students use target words to talk or write about how they **‘formulated a plan’**, **‘conducted examinations’**, **‘classified plants’** etc. If needed, the teacher prompts use of words by asking such as “What could you say instead of “put in a group”? or “What word would be better instead of “made”? When students use the words, the teacher gives feedback (e.g., *“Good use of the word _____”*). The teacher may also say the sentence with the word aloud as further demonstration for the class.

At the start of the remaining two classes in the week, the teacher reminds the students of the target words, writes the words on the whiteboard, and encourages students to use the words in appropriate contexts during science activities (in verbal discussions and written reports) using the techniques described above.

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References:

- Beck, I. L., McKeown, M. G., & Kucan, L. (2002). *Bringing words to life*. New York, NY: The Guilford Press.
- Beck, I. L., McKeown, M. G., & Kucan, L. (2013). *Bringing Words to Life: Robust Vocabulary Instruction*. New York, NY: Guilford Press.

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Structure and definitions within the intervention taxonomy

Aspect I Modality/Domain Note: Categories in Aspect I are the same as for Aspect I in the assessment taxonomy (Denman et al., 2019).		
Modality	Spoken Language	Language exchanged verbally, or via an alternative in situations where peers would typically use verbal communication (includes pre-linguistic communication). <i>Examples:</i> <ul style="list-style-type: none"> • <i>Intervention using a single mode of spoken communication (single-modality) e.g., Speech-only or AUSLAN.</i> • <i>Intervention using multiple modes of spoken communication (multi-modal) e.g., Key-word sign or Aided language stimulation.</i> (American Speech and Hearing Association, n.d.; Beukelman & Mirenda, 2013b).
	Written Language	Language exchanged through text (print) or via an alternative in situations where peers would typically be reading or writing. <i>Examples:</i> <ul style="list-style-type: none"> • <i>Intervention targeting written communication via a single mode (single-modality) e.g., Text-only or Braille.</i> • <i>Intervention targeting written communication via multiple modes (multi-modal) e.g., Text with symbol support.</i> (American Speech and Hearing Association, n.d.; Beukelman & Mirenda, 2013b).
Domains	Semantics	Understanding and expression of words and word meanings (e.g., vocabulary, word retrieval, lexical meaning). <i>Examples:</i> <ul style="list-style-type: none"> • <i>A child learns to define the meanings of, and use, a variety of adjective words for improved narrative retelling.</i> • <i>A child learns to identify the meaning of 'exam instruction words' (e.g., analyse, contrast, explain, define, summarize etc) for improved comprehension of written instructions in class.</i> (American Speech and Hearing Association, n.d.; Beukelman & Mirenda, 2013b; Boyle et al., 2007).
	Morphosyntax	Understanding and expression of different word forms and the order and combination of words in sentences. <i>Examples:</i> <ul style="list-style-type: none"> • <i>A child explicitly learns and practices production of past tense verb forms whilst retelling an event.</i> • <i>A child practices producing complex sentences with conjunctions (e.g., because, if, when).</i> (American Speech and Hearing Association, n.d.; Beukelman & Mirenda, 2013b; Boyle et al., 2007).

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Domains	Social Abilities and Discourse	<p>Giving and making meaning in social context or communication for social purposes. Includes:</p> <ul style="list-style-type: none"> - Pre-linguistic communication e.g., facial expression, joint attention, gesturing. - Communication intentions/purposes e.g., requesting, commenting, greetings, asking questions, giving reasons, making predictions. - Non-verbal communication e.g., use of body language or understanding emotions conveyed in facial expressions and tone of voice. - Non-literal language e.g., inferences, idioms, metaphors, jokes, sarcasm. - Matching communication style to social context e.g., adjusting communication style between friends and teachers. - Conversation conventions e.g., topic selection and maintenance, conversational turn taking. - Text cohesion e.g., verbal fluency (mazes and incomplete sentences), transitions between sentences/paragraphs. - Text organisation (discourse or macrostructure) e.g., narrative structure, episodic structure. <p><i>Examples:</i></p> <ul style="list-style-type: none"> • <i>A child learns to use symbols to communicate for a range of communicative functions.</i> • <i>A child learns to stay on topic and take turns in conversation.</i> • <i>A child learns to sequence information in order and follow genre-specific conventions (story grammar) when telling a narrative.</i> <p>(American Speech and Hearing Association, n.d.; Beukelman & Mirenda, 2013b; Boyle et al., 2007).</p>
	Meta-Language	<p>Ability to think about own thought processes and understand how to regulate these processes for effective learning. Includes:</p> <ul style="list-style-type: none"> - Meta-cognition: Knowledge and use of strategies for managing and own learning. - Meta-language: Knowledge of phonemic (phonemic awareness), morphological/syntactic (meta-syntactic) or text-level (meta-narrative) rules in relation to own skills; and ability to effectively apply these rules for improved performance. - Meta-pragmatics: Knowledge of social conventions in relation to own communication and ability to apply this knowledge to improve communication with others. <p><i>Examples:</i></p> <ul style="list-style-type: none"> • <i>A child explicitly learns to identify and implement strategies that facilitate their own learning or performance e.g., “It helps me find and correct grammatical mistakes when I read my written work aloud to myself” (meta-cognitive).</i> • <i>A child explicitly learns about the phonological structure of words (phonological awareness skills) by segmenting words into sounds (meta-language).</i> • <i>A child’s meta-pragmatic skills are assessed by asking the child to describe what they would do in a social situation and why (meta-pragmatics).</i> <p>(American Speech and Hearing Association, n.d.; Larson & McKinley, 2003b; Law et al., 2008).</p>
	Executive Functions	<p>Collection of related cognitive processes necessary for execution of goal-directed, controlled, purposeful behavior. Includes:</p> <ul style="list-style-type: none"> - Inhibition (self-control): Ability to focus and attend to tasks through suppression of inappropriate thoughts, comments, and behaviors. - Emotion control (self-regulation): Ability to manage emotions for task completion. - Working memory: Ability to retain, process and manipulate pieces of information for short periods of time to complete required tasks. - Organisation: (strategic planning) Ability to use organisational strategies for task completion e.g., envisioning the end product, planning steps to complete tasks, and identifying solutions to problems. - Mental flexibility: Ability to integrate prior knowledge and experiences or effectively apply of different rules for different situations. - Sustained attention: Ability to maintain attention to tasks despite distractions or fatigue. <p><i>Examples:</i></p> <ul style="list-style-type: none"> • <i>A child explicitly learns and practices skills for successful project completion e.g., forming a plan, identifying project stages, identifying/collecting materials needed, implementing the plan, checking progress according to plan (organisation and self-regulation).</i> • <i>The length of time for which a child stays focused on task is gradually increased each day, with prompts also faded over time (sustained attention).</i> <p>(Dawson & Guare, 2015; Henry et al., 2012; Singer & Bashir, 1999; Ukrainetz, 2006a; Wolter, 2007).</p>

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Comprehension or production	Comprehension	Understanding of information, knowledge and ideas communicated by others (includes verbal and non-verbal). <i>Examples:</i> <ul style="list-style-type: none">• <i>A child learns to follow multi-step verbal directions with spatial concepts.</i>• <i>A child learns strategies to improve reading comprehension.</i>• <i>A child learns to understand emotions conveyed in the facial expressions of others.</i> <hr/> (American Speech and Hearing Association, n.d.; Boyle et al., 2007; Law et al., 2003).
	Production	Ability to convey information, knowledge, and ideas to others (includes verbal or non-verbal) <i>Examples:</i> <ul style="list-style-type: none">• <i>A child learns to produce complex sentences with coordinating conjunctions.</i>• <i>A child learns strategies to improve spelling of words.</i>• <i>A child learns to use vocalizations to intentionally communicate basic wants and needs.</i> <hr/> (American Speech and Hearing Association, n.d.; Boyle et al., 2007; Law et al., 2003).

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Aspect II Intervention Purpose		
Purpose	Skill Development	<p>Interventions aimed at improving communication by directly teaching skills that are impaired or lacking (i.e., lessen the degree of disorder or remediate deficits associated with a condition).</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> - <i>A child learns to correctly produce grammatical forms when describing pictures (development of syntax skills).</i> - <i>A child learns the skill of identifying sounds in words (development of meta-abilities, specifically phonemic awareness).</i> - <i>A child learns to identify the components contained in well-structured narrative stories and apply this structure to their own story writing (development of meta-abilities, specifically meta-narrative skills).</i> <p>(Justice & Redle, 2014; Paul & Norbury, 2012c; Ukrainetz, 2015b).</p>
	Strategy Use	<p>Interventions aimed at improving communication by teaching functional strategies. The intervention does not intend to directly alter the disorder but aims to teach use of strategies for more effective communication (i.e., compensatory strategies).</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> • <i>A child learns strategies for identifying and managing communication breakdowns in conversation (strategy for managing difficulties with social abilities).</i> • <i>A child learns to use a thesaurus to increase the variety of vocabulary used in creative writing (strategy of managing semantic difficulties).</i> • <i>A child learns organisational strategies, such as referring to a list of items they need each day whilst packing bag (strategy for managing difficulties with executive functioning, specifically organisation).</i> <p>(Justice & Redle, 2014; Paul & Norbury, 2012c; Ukrainetz, 2015b).</p>

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Aspect III Intervention Delivery	
Method	<p>Delivered by SLP</p> <p>Interventions primarily delivered by an SLP. These interventions may involve others as communication partners or include follow-up activities or homework delivered by others; however, the SLP is the primary person providing the intervention for the duration of the intervention block.</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> • <i>Child receives weekly intervention conducted by SLP with home practice provided.</i> • <i>SLP works with a child in class each week to support understanding of curriculum vocabulary.</i> <p>(Boyle et al., 2007; Cirrin et al., 2010; Dickson et al., 2009).</p>
	<p>Delivered by Other</p> <p>Interventions primarily delivered by other people e.g., parent, teacher, teacher-aide, other professional, therapy assistant etc. The role of SLP input is to train or support “others”. This may include providing training/coaching, giving instructions/advice, or supplying intervention materials. The SLP may also conduct intervention with the child for the specific purpose of modelling or demonstrating to those being trained. The level of SLP input may vary highly depending on the training needs or may vary over time e.g., the SLP may have high input initially which then reduces as the “other” person becomes trained.</p> <p><i>Examples:</i></p> <ul style="list-style-type: none"> • <i>In SLP sessions, the SLP specifically models and trains a parent to implement language stimulation techniques at home.</i> • <i>SLP provides teacher training on classroom strategies to facilitate improved learning of vocabulary words.</i> • <i>A teacher-aide delivers a manualized language intervention program to small groups of identified children.</i> <p>(Boyle et al., 2007; Cirrin et al., 2010; Dickson et al., 2009).</p>
	<p>Face-Face (only applicable to interventions delivered by a person)</p> <p>Intervention is conducted with the child and the person delivering the intervention in the same room.</p> <p><i>Example:</i></p> <ul style="list-style-type: none"> • <i>A child attends face-to-face intervention sessions with an SLP (or another trained person).</i> <p>(American Speech and Hearing Association, 2010; Molini-Avejonas et al., 2015).</p>
	<p>ICT (only applicable to interventions delivered by a person)</p> <p>Intervention is delivered with the child and the person delivering the intervention communicating through ICTs (information and communication technologies) e.g., videoconferencing, web-conferencing, telephone.</p> <p>Note: Technology that is not used for simultaneous two-way communication is not considered ICT.</p> <p><i>Example:</i></p> <ul style="list-style-type: none"> • <i>A child participates intervention sessions delivered via Skype or Zoom with an SLP (or another trained person).</i> <p>(American Speech and Hearing Association, 2010; Molini-Avejonas et al., 2015).</p>
	<p>Software-based</p> <p>The intervention is predominantly a computerized process (i.e., App, web-based program, or computer program) with no (or very limited) input from a person. The software selects tasks, presents tasks and gives feedback. A person may set a child up with a computer or be present as adult supervision. If a person is required to select tasks or provide specific feedback, then the intervention is not categorized as software.</p> <p><i>Example:</i></p> <ul style="list-style-type: none"> • <i>A child participates in intervention conducted by an App.</i> <p>(Knight et al., 2013; Pokorni et al., 2004; Ramdoss et al., 2011).</p>

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Tier of support	Whole Class (Tier One)	Interventions delivered as (and suited for) whole class teaching i.e., one adult per seven or more children. This may include interventions used to support universal design or curriculum differentiation. (Law et al., 2012; Sanger et al., 2012; Speech Pathology Australia, 2014).
	Small Group (Tier Two)	Interventions delivered as (and suited for) small group teaching i.e., one adult for two-six children. This may include in-class focused support for small groups of “at-risk” children. (Law et al., 2012; Sanger et al., 2012; Speech Pathology Australia, 2014).
	Individualized (Tier Three)	Intervention delivered to an individual child. (Law et al., 2012; Sanger et al., 2012; Speech Pathology Australia, 2014).
Environmental context	Clinical context	Skills are learned in a clinical context i.e., intervention does not incorporate materials or communication partners from day-to-day environments. Note: This category refers to the context being targeted in intervention, which may not be the same as physical location. <i>Example:</i> <ul style="list-style-type: none"> • <i>A child is withdrawn from regular classroom activities for narrative intervention conducted by an SLP using materials that the SLP has brought to the school.</i> (Fey, 1986a; McCauley et al., 2017).
	School context	Intervention occurs in a school (or Kindy) context i.e., intervention incorporates communication partners, communication situations, or materials that represent a school environment. Note: This category refers to the context being targeted in intervention, which may not be the same as physical location. <i>Examples:</i> <ul style="list-style-type: none"> • <i>An SLP works with a child in class to explicitly teach the sentence structures that a child needs to complete the assessment task for the current English unit of work at school.</i> (McCauley et al., 2017; Ukrainetz, 2015c).
	Home context	Intervention occurs in a home context i.e., intervention incorporates communication partners, communication situations, or materials that represent a home environment. Note: This category refers to the context being targeted in intervention, which may not be the same as physical location. <i>Example:</i> <ul style="list-style-type: none"> • <i>During an appointment in an outpatient clinic, an SLP trains a parent to support social skills whilst the child interacts with siblings in activities similar to the activities that occur at home.</i> (Fey, 1986a; McCauley et al., 2017; Paul & Roth, 2011).
	Other community context	Intervention occurs in a community context that is not home or school i.e., intervention incorporates communication partners, communication situations, or materials that represent a community environment. Examples might include a workplace, shopping centre, or sporting activity. Note: This category refers to the context being targeted in intervention, which may not be the same as physical location. <i>Example:</i> <ul style="list-style-type: none"> • <i>An SLP assists a child learn to specific skills that are needed for a work experience placement e.g., interacting with customers, writing down orders from the menu and counting money.</i> (Fey, 1986a; McCauley et al., 2017; Paul & Roth, 2011).

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Aspect IV Intervention Form	
Task Type	<p>De-contextualized – Hierarchical</p> <p>Naturalness of communication: Discrete skills are targeted in highly structured tasks that are selected and directed by the adult i.e., clinician-directed approach. Intervention sessions typically consist of a series of repetitive, drill-based tasks with minimal topic continuity between tasks. Games (or motivating tasks) may be used to make intervention entertaining; however, the target skills are not an inherent part of the game.</p> <p>Intervention structure: Skills are taught following a set (usually developmental) sequence, with progress to subsequent tasks dependent on mastery of previously targeted skills i.e., bottom-up or deductive approach. Later stages may move towards more contextualized activities for generalization; however, the intervention initially teaches skills in de-contextualized tasks (this is unlike contextualized and activity-focused interventions which occur in naturalistic or real-life activities from the outset).</p> <p>Theoretical background: The underlying theory is that earlier developing skills should be taught first, and skills are mastered in highly structured situations before generalization to everyday communicative contexts.</p> <p>Examples:</p> <ul style="list-style-type: none"> • <i>The communicative function of request-making is targeted in adult-directed, drill tasks designed for repetitive practice of "requesting" desired items/objects. Successive goals are introduced as previous goals are mastered.</i> • <i>A child develops phonemic awareness skills through a software program that presents sound identification and manipulation tasks in spoken single words (e.g., Tell us how many sounds you hear in the word "dog"). Tasks are presented in developmental sequence based on the child's success with previous tasks.</i> • <i>A child learns to produce sentences with conjunctions during a series of drill tasks using picture cards as stimulus. Comprehension is taught before production and earlier developing conjunctions are taught first, with later developing conjunctions targeted after earlier conjunctions have been mastered.</i> • <i>A child practices mnemonic strategies whilst repeating strings of random numbers or words. The length of the strings of numbers or words gradually increases in length over time.</i> <p>(Damico & Damico, 1997; Fey, 1986e; Gillam et al., 2012; Helland et al., 2011; Koole et al., 2015; Paesani, 2005; Ukrainetz, 2015b).</p>
	<p>De-contextualized - Non-Hierarchical</p> <p>Naturalness of communication: Same as for de-contextualized – hierarchical (see above).</p> <p>Intervention structure: A variety of skills are practiced without a defined teaching sequence or a plan for how skills combine i.e., intervention does not follow a set developmental or hierarchical sequence.</p> <p>Theoretical background: The underlying theory is that practice of discrete language skills stimulates cognitive processing and leads to enhanced overall functioning.</p> <p>Examples:</p> <ul style="list-style-type: none"> • <i>A child practices producing a variety of vocabulary words related to animals, people, and food in a picture naming task (and gets a turn at a game as a reward for naming each picture). Targeted words are not selected based on any defined sequence, topic, or developmental order.</i> • <i>A child practices following directions containing a variety of different concepts whilst playing a barrier game. Concepts are not selected based on any defined sequence, topic, or developmental order.</i> • <i>A child learns to explain what different idioms mean by turning over cards in a board game and explaining the meaning of the idiom written on each card.</i> <p>(Fey, 1986e; Gillam et al., 2012; Koole et al., 2015; Ukrainetz, 2015b)</p>

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Task Type	Contextualized	<p>Naturalness of communication: Intervention activities are structured and directed by the SLP but occur in meaningful, natural interactions between the child and the adult i.e., hybrid approach. Intervention sessions are centered on a topic, such as a storybook selected by the SLP, with topic continuity across activities within a teaching session.</p> <p>Intervention structure: Intervention may not be structured according to a hierarchical sequence, as the focus is on maintaining a meaningful context i.e., top-down or inductive approach.</p> <p>Theoretical background: The underlying theory is that skills should be developed in naturalistic and meaningful contexts. Discrete skills may be targeted; however, focus remains on a communicative purpose, such as telling a story.</p> <p>Examples:</p> <ul style="list-style-type: none"> • <i>An art task is selected to target the communicative function of “requesting”. The adult models appropriate requests whilst interacting with the child; sets up naturalistic situations where requests are needed (e.g., putting crayons out of reach); and provides scaffolding to assist the child to make requests.</i> • <i>In shared book reading (using specifically selected picture books) a child is supported to learn phonemic awareness skills i.e., ‘sounding out’ words from the book.</i> • <i>A parent models targeted sentence structures whilst building with Lego and encourages the child to produce targeted sentences structures by asking specially selected questions about the Lego.</i> • <i>A game of “Go-Fish” with an SLP is used for the purpose of practicing social communication skills such as turn taking and following rules in a game.</i> <p>(Fey, 1986d; Gillam et al., 2012; Koole et al., 2015; Ukrainetz, 2015b)</p>
	Activity-focused	<p>Naturalness of communication: Intervention occurs within the child’s regular everyday activities or school curriculum, with adults responding to the child’s communication by providing scaffolding and supports i.e., child-directed approach. Skills are taught directly within the daily-life activities in which they occur, with focus on functional performance and use of skills needed to complete the activity. Where discrete skill acquisition occurs, this is directly linked to the specific activity being targeted.</p> <p>Intervention structure: Intervention targets are selected based on functional skills needed to complete an activity, rather than on a developmental or hierarchical sequence.</p> <p>Theoretical background: The underlying theory is that intervention should be directly aimed at facilitating participation, functional performance, or independence in everyday activities (activity and participation levels of the ICF).</p> <p>Examples:</p> <ul style="list-style-type: none"> • <i>During typical child-directed play at lunchtime, a child is supported (through scaffolding and prompting from an adult) to further develop social communication skills such as making appropriately requests for the ball, taking turns, and following rules.</i> • <i>Whilst participating in an English lesson at school, a child is supported to learn phonemic awareness skills i.e., ‘sounding out’ words as they write them.</i> • <i>Whilst reading a factual report for a school assignment in class, a child learns to use a dictionary to understand the meaning of unfamiliar words.</i> • <i>When cooking a family meal at home, a child is supported to learn the meaning of vocabulary words in recipes e.g., chop, whip, flip, sprinkle, sift.</i> <p>(Fey, 1986c; Hyter, 2003; Ukrainetz, 2015b; Westby, 2007)</p>

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<p>Aspect V</p> <p>Teaching Techniques</p> <p>(Beukelman & Mirenda, 2013a, 2013b; Ebbels, 2007; Eisenberg, 2014; Embry & Biglan, 2008; Gillam & Loeb, 2010; Hegde, 2006; Hyter, 2003; Kaderavek, 2015b; Kamhi, 2014; McClintock et al., 2014; Paul & Norbury, 2012c; Proctor-Williams, 2009; Proctor-Williams & Fey, 2007; Reichow & Volkmar, 2010; Rosenshine, 2012; Roth & Paul, 2014; Smith-Lock et al., 2013; Smith-Lock et al., 2015; Snell et al., 2006; Starling et al., 2012; Warren et al., 2007; White et al., 2007).</p>		
<p>Prompting techniques</p>	<p>Time delay (expectant waiting)</p>	<p>Waiting longer than is typical for a desired response (with no other prompts provided while waiting).</p>
	<p>Physical (tactile) prompts/cues</p>	<p>Use of touch to prompt or cue a child to begin or continue a task e.g., hand over hand manipulation or shoulder touch to prompt a response.</p>
	<p>Gestural prompts/cues</p>	<p>Use of gesture or facial expression to elicit a target response e.g., pointing to an object of importance; gesture to remind child of a required response.</p>
	<p>Visual prompts/cues</p>	<p>Use of visual prompts or cues (pictures, symbols, or writing) to elicit a target response e.g., provision of a picture to prompt production of a word; symbols to prompt retell of a story.</p>
	<p>Verbal (auditory) prompts/cues</p>	<p>Use of a verbal prompt or cue to elicit a target response. This may include:</p> <ul style="list-style-type: none"> - Questions (open or closed): Use of questions to elicit a targeted response. The format of questions varies depending on the desired response e.g., “What did the boy do yesterday? (to elicit a morphological form);” “Why did you choose that answer? (to elicit a demonstration of meta-awareness);” “Is the carrot orange or red?” (to prompt for additional information). - Suggestions (direct or indirect): May be a direct instruction regarding the expected response e.g., “Use ‘ed’ at the end of the word.” Or an indirect ‘reminder’ of what is expected e.g., “Remember that we are talking about something that happened yesterday.” - Cloze completion: Providing a word, sentence, or phase for the child to complete e.g., “The boy is _____.” - Phonemic prompt: Use of an initial sound/syllable in a word to prompt a response e.g., “A carrot is a type of veg...” or “The word starts with an ‘s’ sound.”
	<p>Modeling for Imitation</p>	<p>Specific request/expectation for the child to produce (imitate) a response (verbal, written, symbolic or gestural) that has been explicitly modeled e.g., “Say _____”. The imitation may be a direct or delayed; or may be a response to a predictable or scripted scenario.</p>
<p>Linguistic techniques</p>	<p>Modeling for Demonstration</p>	<p>Deliberate presentation or model of an intervention target, without expectation of immediate response from the child. Demonstrations may be provided by:</p> <ul style="list-style-type: none"> - Adult modeling (either in real-time or through videorecording). - Peer modeling (either in real-time or through videorecording). Note: the presence of peers does not in itself constitute “peer-modeling” unless the peer has been deliberately primed or placed to provide modeling. - Video modeling (or video feed-forward): child’s response is recorded and then edited and corrected before playback to child.
	<p>Think Aloud</p>	<p>Verbalization of the problem-solving processes or strategies involved in completing a task such as making predictions, decoding texts, summarizing information, editing, and writing e.g., adult verbalizes the strategies used when an unfamiliar word is encountered in a text.</p>
	<p>Inflection for demonstration</p>	<p>Demonstrational models in which deliberate stress is given to a target e.g., “The boy walkED” or “I hear a “sh” sound in the word Shell”.</p>
	<p>Focused contrast</p>	<p>Deliberate comparing of incorrect response with a correct response e.g., “We don’t say: ‘Yesterday this girl walk’; we say: ‘Yesterday this girl walked’ or provision an explanation such as “This boy called out in class, but he should have put his hand up”.</p>
	<p>Recasts/ expansions</p>	<p>Immediate repetition of the child’s utterance with correction or modification of a target word or structure, whilst maintaining the core meaning of the utterance.</p>

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Regulatory techniques	Extensions	Immediate response to child's utterance by the adding one or more linguistic forms to expand the complexity or meaning of the utterance.
	Explicit instructions	<p>Explicit instructions: Explicit instructions regarding the use of target forms, such as linguistic rules or social expectations are provided. Instructions may be provided as:</p> <ul style="list-style-type: none"> - Verbal (explicit) instructions: Verbal information is provided to make the child explicitly aware of the linguistic rules or features being taught e.g., "If something happened in the past tense we say 'ed' at the end of the word" or "When a person answers the phone, you say hello first and then tell the person who is calling". - Visual (explicit) instructions: Visual materials are used to explicitly explain the linguistic rules or features being taught e.g., colors and shapes are used to visually describe grammatical elements in shape-coding intervention or pictures in social stories are used to visually represent a target behavior or concept.
	Relate content to past knowledge	Commenting on links or similarities between tasks or skills e.g. "The word 'vague' is similar to the word 'uncertain' that you learned last week" or "When you have something to say, you should wait until the other person has finished talking; just like in a game when you have to wait for the other person to have their turn before you have your turn."
	Explanation of goals or expectations	<p>Learning intentions, goals or task expectations are described in an age-appropriate manner. Note: this is different to the technique "explicit instructions" (described above), because the explanations are about intervention goals or expectations rather than the communication rules/features being taught.</p> <ul style="list-style-type: none"> - Verbal explanation: Verbal information is provided to explain goals or expectations e.g., "Today we are learning to _____ and you will have learnt this when you can _____" or "When you have scored 20/25 or higher you will move onto the next task". - Visual explanation: Visual information is provided to explain goals or expectations e.g., Use of visual chart or written materials to show tasks that the child is expected to complete in an intervention session.
	Feedback	<p>The purpose of feedback is to provide the child with specific information on their performance (strengths and weaknesses) in relation to what is being taught. Feedback is intentional, specific to the intervention goal and provided immediately (or as soon as practicable) after the child's performance. This may include:</p> <ul style="list-style-type: none"> - Verbal feedback: Child receives verbal information regarding their response or performance e.g., "Oops, you forgot to say _____" or "Good work! You remembered to describe who the characters in the story are". - Visual feedback: Child receives visual information regarding their response or performance e.g., the barrier is lifted in a barrier game so the child can see differences in their response compared to a correct response, or a teacher holds up different colored cards in class as a way of giving feedback on a specific communication behavior. - Repetition as feedback: Child's own response is repeated as a means of encouraging the child to correct their response e.g., "Did you mean to say _____?" or "Does _____ sound right?" Repetition may be provided by an adult or may be a recording of the child's response played back. - Natural consequence: Feedback received through natural consequence in an interaction e.g., communication partner gives a confused look; child does/does not find an object by following a direction; or child receives/does not receive the item that they tried request.
	Rewards/reinforcement	<p>Rewards (positive reinforcement) provided for the purpose of keeping the child motivated or interested. Rewards include non-tangible reinforcement e.g., child receives opportunity to engage in a favored activity after task completion; or tangible reinforcement e.g., child receives favored items after task completion.</p> <p>Notes: Natural consequences (above) are not also counted as rewards - if a child receives an item that they successfully requested in an intervention task, then this is identified as a natural consequence rather than a reward. However, rewards may be provided in addition to a natural consequence e.g., child may receive they item they requested and then also get a sticker to place on a chart.</p> <p>Verbal praise, encouragements and positive affirmations have not been included as "rewards" in this taxonomy. This is because positive interactions with clients is considered to have a place in all interventions (either with or without other rewards or feedback) and are thus not a feature that distinguishes some interventions from others.</p>

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Table summarizing changes to the taxonomy over rounds and the qualitative and quantitative data that informed changes.

Changes to taxonomy after each round:	Qualitative data: Themes from participant comments that informed change	Qualitative data: Examples of participant comments related to the identified theme	Quantitative data: Level of agreement
<p>R1 = Changes after Round one R2 = Changes after Round two NA = Not applicable for this round</p> <p>(Note: no changes after Round three as this was the last round)</p>		<p>R1 = Comment from Round one R2 = Comment from Round two R3 = Comment from Round three NA = Not applicable for this round (no comments in this round related to this theme)</p>	<p>R1: Round one R2: Round two R3: Round three</p>
<p>Aspect 1 R1: Structural change made to the flowchart i.e., the components 'Comprehension' and 'Production' were placed after other domain categories in the taxonomy flowchart. R2: NA</p>	<p>Suggestion to change sequence in flowchart by placing 'comprehension' & 'production' after the other domain categories.</p>	<p>R1: "Consider if the domains should come before comprehension and production. Much of language requires the integration of comprehension and production so may be better to consider which domain the child is most challenged in before considering receptive versus expressive (if this is even applicable). Not every language domain has a dominant comprehension or production component." R2: NA R3: NA</p>	<p>This suggestion was not linked to lack of consensus but was actioned to improve the taxonomy.</p>
<p>Aspect 1 R1: Additional information was added to the definitions of 'Discourse' and 'Social Abilities' to create greater distinction between these two categories. R2: The two categories 'Discourse' and 'Social Abilities' were amalgamated into one category.</p>	<p>Identification of possible overlap between categories of 'Discourse' and 'Social Abilities'.</p>	<p>R1: NA R2: "I do not agree that Discourse only relates to the types listed, as conversation is a type of discourse, so much of what is classified as 'social abilities' is an aspect of 'Discourse'" R3: NA</p>	<p>R1 and R2: Lack of consensus on application of category 'discourse' for describing the domains targeted in interventions.</p>
<p>Aspect 1 R1: Additional information and examples were added to indicate how interventions targeting pre-linguistic communication may be categorized. R2: NA</p>	<p>Suggestion to add clarification to ensure that categorisation of pre-linguistic communication is clear</p>	<p>R1: "As the taxonomy is valid for school age children regardless of severity etc, potentially an element that incorporates pre-symbolic and pre-intentional 'spoken language?'" R2: NA R3: NA</p>	<p>This suggestion not linked to lack of consensus but was actioned to improve the taxonomy.</p>
<p>Aspect 1 R1: Additional information was added to indicate how interventions that use multi-modal communication are categorized. R2: NA</p>	<p>Identification that SLPs may have less clarity regarding categorisation of interventions for children who use multi-modal communication.</p>	<p>R1: "The wording for the definition of "Spoken" and "Written" language may need some clarification. Both refer to 'symbols', creating some ambiguity in the decision regarding PECS". R2: NA R3: "Semantics - could have been taken as demonstrating understanding/use of words and word meaning via nonverbal process (i.e., connecting word and picture)".</p>	<p>R1: Participants did not reach consensus on whether 'PECS' targets written language. R2 & R3: Participants did not reach consensus on whether case study with PECS targets semantics.</p>
<p>Aspect 1 R1: The interventions being categorized in the Delphi study were placed in into case studies so that participants consider the interventions in the same context as other participants.</p>	<p>Identification that participants may be considering multiple ways an intervention could be conducted.</p>	<p>R1: "This becomes tricky to categorize as often SLPs will adapt the programs or modify to suit the child's needs [to] potentially any of these could be adapted and applied to meet client needs in any areas. This may mean that the program is not followed according to how it has been written. SLPs I have observed in my clinical practice "take parts" for example, PECS, but do not follow this program." R2: NA R3: NA</p>	<p>R1-R3: Lack of consensus on application of categories for describing the domains targeted by interventions.</p>

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Changes to taxonomy after each round: R1 = Changes after Round one R2 = Changes after Round two NA = Not applicable for this round (Note: no changes after Round three as this was the last round)	Qualitative data: Themes from participant comments that informed change	Qualitative data: Examples of participant comments related to the identified theme R1 = Comment from Round one R2 = Comment from Round two R3 = Comment from Round three NA = Not applicable for this round (no comments in this round related to this theme)	Quantitative data: Level of agreement R1: Round one R2: Round two R3: Round three
Aspect I R1: NA R2: Clarification was provided to highlight that only the main domains that are explicitly targeted in an intervention are selected (and it is not implied that the intervention does not have any elements of other categories). Options for this aspect were reduced in the survey (i.e., participants could only select one other category in addition to categories that reached consensus in round 2).	Identification that participants may be describing all possible domains involved in a task, rather than key domains being targeted by the intervention.	R1: NA R2: NA R3: "People are most likely assuming that, in order to have expressive skills & make requests, you require comprehension & thus comprehension is inherently required. Semantics is meaning so some overlap exists".	R2 & R3: Lack of consensus categorisation of case study one as targeting 'semantics'
Aspect II R1: Change in category names for Aspect II i.e., 'skill development' instead of 'remediation' and 'strategy-use' instead of 'compensation'. Additional information was added to definitions to explain that skill development does not imply that full 'remediation' will be achieved. R2: Clarification was provided to highlight that the main purpose of an intervention is selected (and it is not implied that the intervention does not have any elements of the other category).	Identification of possible overlap between categories of 'skill development' and 'strategy use'	R1: "The distinction between these two areas can be blurry for students with whom you still work on directly improving skills though they may not ever 'catch-up' and have the impairment fixed." R2: "I don't see skill development and strategy [use] to be mutually exclusive necessarily" R3: "Is it because in teaching a strategy you are developing a skill?"	R1 & R2: Lack of consensus on categorisation of intervention using PECS on Aspect II categories.
Aspect II R2: Correct terms for 'skill development' and 'strategy use' used in the round three survey.	Participants identified a that the round one terms were used in one of the round two survey questions by mistake.	R1: NA R2: "Definitions [of] the terms skill development / strategy use are used in the Delphi document; however change disorder / compensation are used in the survey" R3: NA	R2: This was not linked to lack of consensus as the definitions for categories were correct.
Aspect II R1: The interventions being categorized in the Delphi study were placed in into case studies so that participants consider the interventions in the same context as other participants. R2: Further information was added to the definitions to identify that, although multimodal communication may replace speech production; interventions are categorized by according to purpose of the interventions in terms of language development.	Identification that SLPs may have less clarity regarding categorisation of interventions for children who use multi-modal communication.	R1: "PECS could be either remediation or compensation, dependent on the client" R2: NA R3: "I think if this doesn't reach consensus it may be due to assuming AAC is a factor. However, the actual goal is communication intent and word production."	R1 & R2: Lack of consensus on categorisation of intervention using PECS on Aspect II

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Aspect III R1: Change in category names for describing service method by replacing the terms 'direct' and 'indirect' with 'delivered by SLP' and 'delivered by others' (Aspect III).	Identification that terms 'direct' and 'indirect' may be ambiguous	R1: "...I think confusion will arise. Why do the terms direct & indirect need to be used? Why cannot it just be: SP administered, Other / non-SP administered?" R2: NA	R1: Lack of consensus on categorisation of intervention using PECS on delivery method (Aspect III)
Aspect III R1: Information was added to definition of 'delivered by other' to explain that even though significant SLP time may be involved to support interventions 'delivered by others', these interventions are still categorized as such. It is beyond the scope of the taxonomy to describe the types of supports SLPs may use in 'training' others.	Identification that lack of clarity may exist with categorisation of interventions conducted by others as these interventions may still require considerable input from SLP	R1: "I feel this [these terms] is somewhat limited for some service delivery models and especially for those [interventions] in which a more collaborative model is used or where the 'therapy' is implemented across a range of daily routines and programs with relevant training and upskilling of all staff". R2: NA	R1: Lack of consensus on categorisation of intervention using PECS on delivery method (Aspect III)
Aspect III R1: NA R2: Further information was added to definition of 'software' to clarify that this refers to interventions that are conducted predominantly through a computerized process.	Identification that lack of clarity may exist with categorisation of interventions as 'software' versus 'delivered by others'	R1: NA R2: "Can't software be delivered by another person e.g., ELR [Extra Language Resource] - parents can pay for a subscription to this compute-based software intervention".	R2: This was not linked to lack of consensus but was actioned to improve the clarity of definitions with the taxonomy.
Aspect III R1: Change in category name was made by changing 'internet' to 'information and communication technologies'. R2: Further information was added to clarify definition of 'information and communication technologies' i.e., technologies used for two-way communication.	Identification that lack of clarity may exist with definition of terms "Internet" and "ICT".	R1: "...Examples of internet based are not all using the 'internet' so a possibly confusing term to use if covering other than 'internet'. Would technology or Information and Communication technologies (ICT) be better?" R2: "...does video-recording and/or audio-recording come under ICT?"	R1: Lack of consensus with identification of some interventions in this category. R2: This was not linked to lack of consensus but was actioned to improve definition.
Aspect III R1: The word 'setting' was changed to 'environmental context' and clarification and examples were added to the definitions of environmental context categories to highlight that these categories identify the environmental context and not the physical location. R2: Further clarification was provided to highlight that the categories in 'environmental context' refer to environmental context and not the physical location.	Lack of clarity with definitions for 'environmental context' with some participants interpreting this as being physical location, rather than 'environmental context'.	R1: "Home setting could include 'homework time'". R2: "The setting (clinic vs community) may not be accurately distinguished. A structured assessment may occur at a school location, an observation in the classroom may provide assessment information, an everyday situation may be set up in a location where services are delivered, etc. Definitions need internalising for accurate response (not intuitive). R3: "Again people might get caught up on where the intervention physically took place, instead of considering the origin of the materials used in therapy".	R1-R3: Lack of consensus with selection of 'environmental context' categories to describe assessments.

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Aspect III R1: The interventions being categorized in the Delphi study were placed in into case studies so that participants consider the interventions in the same context as other participants. R2: NA	Identification that participants may be considering multiple ways an intervention could be conducted.	R1: "There may be software versions of these interventions but I'm not aware of them." R2: NA	R1: Lack of consensus on categorisation of some interventions on delivery method and tier of support (Aspect III) R2: NA
Aspect IV R1: Examples were added to the definitions of 'task types' to highlight distinctions between categories. R2: The information contained within each definition was formatted under headings to highlight the key features being described by each term.	Identification that SLPs may perceive overlap between categories (particularly between 'contextualized' and 'activity-focused').	R1: "I think more examples are needed for each task type as I have thought about how I would categorize the therapy I do, and I would find it hard to differentiate between them without more examples." R2: "Contextualized and activity focussed interventions appear somewhat similar/may be seen as overlapping. Can these categories be further defined/differentiated to help clinicians understand the contrast between these categories?" R3: "Contextualized and Activity focused - both seem to include a focus on functional activities, which can be confusing when trying to select one category".	R1-R3: Lack of consensus with selection of Aspect IV 'Task Type' categories to describe interventions.
Aspect IV NA (No changes after round three as this was the last round)	Identification that understanding and applying the taxonomy accurately takes time and consideration (i.e., high level of information processing).	R1: NA R2: NA R3: "Lots of information to digest and apply".	R1-R3: Lack of consensus with selection of Aspect IV 'Task Type' categories to describe interventions.
Aspect IV R1: The interventions being categorized in the Delphi study were placed in into case studies so that participants consider the interventions in the same context as other participants. R2: NA	Identification that participants may be considering multiple ways an intervention could be conducted.	R1: "The robust vocabulary intervention is difficult to categorize as its more of a generic approach that can involve anything from speech pathologists' training of teachers to adopt the conceptual framework in their regular teaching, to an incidental inclusion of some direct vocabulary instruction in other therapy tasks, to a highly structured approach targeting direct vocabulary instruction alone. Maybe the issue is with the rather restricted explanation of this approach in the link? I've picked the 'best fit' but it wasn't clear cut." R2: NA R3: NA	R1-R3: Lack of consensus with selection of Aspect IV 'Task Type' categories to describe interventions.
Aspect V R1: Information provided to Delphi participants to explain the distinction between 'prompting', 'linguistic' and regulatory' techniques. R2: Further information was added to explain the distinctions between 'prompting', 'linguistic' and regulatory' techniques.	Identification that lack of clarity exists with the structure of Aspect V.	R1: "I'm not quite sure about regulatory. It seemed like the techniques described were a conglomerate of techniques that were like 'other', so I wasn't sure they fitted together that well." R2: "I think it's slightly unclear where the lines are drawn between some categories e.g., under linguistic techniques, the example of a focused contrast is very similar to the of the regulatory technique of giving verbal explicit instructions". R3: "Regulatory techniques makes people think of how you monitor/regulate a skill, but your definition is more about teaching".	R1-R3: Lack of consensus on categorisation of interventions across some categories in Aspect V.

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Aspect V R1: An additional category was added to include 'gestural prompting'. The definitions for different 'prompting techniques' were revised to improve the clarity of definitions. R2: NA	Identification that some non-verbal prompts are not clearly covered under category 'visual prompts'.	R1: "The nonverbal markers and steps involved in PECS that are essential to developing intentional communication don't seem to be acknowledged within these intervention techniques". R2: NA R3: NA	R1-R3: Lack of consensus on the presence of 'visual prompting' in some interventions.
Aspect V R1: Examples were added to the definition of 'verbal prompting' to include questions that prompt meta-cognitive thinking. R2: NA	Identification that lack of clarity exists with verbal promoting designed to elicit metacognitive thinking.	R1: "Add metacognitive techniques. For example, why do you choose that one? How did you know that was what I was asking for?" R2: NA R3: NA	R1: Lack of consensus on the presence of 'verbal prompting' in some interventions.
Aspect V R1: Clarification was added to the definition of 'feedback as repetition' to include feedback about whether child's own response sounds correct. R2: NA	Identification that lack of clarity exists with the range of techniques covered by 'repetition as feedback'.	R1: "Add to Feedback - Repetition or Verbal - student's response may be repeated back verbatim and the student may be asked if that sounds right?" R2: NA R3: NA	R1: Lack of consensus on the presence of 'repetition as feedback' in some interventions.
Aspect V R1: NA R2: Information was added to definitions to further clarify the differences between 'feedback' versus 'rewards'.	Identification that lack of clarity exists with some definitions of 'visual feedback', 'natural feedback' and 'rewards'.	R1: NA R2: "Differentiating between visual feedback & rewards in the context of the year 8 class example was tricky..." R3: "Unsure if teacher writing words on the board constitutes as a visual prompt".	R2-R3: Lack of consensus on categorisation of interventions as "visual feedback" and 'rewards'.
Aspect V NA (No changes after round three as this was the last round)	Identification that SLPs may have less clarity regarding categorisation of interventions for children who use multi-modal communication.	R3: "Communication form (AAC) being interpreted as visual prompt or reward."	R2-R3: Lack of consensus with use of "visual prompts and "rewards" for case study one (PECS).
Aspect V NA (No changes after round three as this was the last round)	Identification that understanding and applying the taxonomy accurately takes time and consideration (i.e., high level of information processing).	R1: NA R2: NA R3: "Perhaps because we use these techniques so naturally/ instinctively and often in combination with each other that when we look at a case and have to explicitly identify these behaviours, we are making unconscious knowledge conscious. This unfamiliar task of 'coding' the behaviour may need practice as we are essentially 'de-synthesising'!"	R1-R3: Lack of consensus with selection of Aspect V categories to describe interventions.
Aspect V R1: The interventions being categorized in the Delphi study were placed in into case studies so that participants consider the interventions in the same context as other participants. R2: Participants instructed to select key teaching techniques used in each case study.	Identification that participants may be considering multiple ways an intervention could be conducted.	R1: "When using the above techniques, you might change these aspects (from what is specified in the manual/instructions) according to different / children's needs/contexts." R2: NA R3: "Some of these[techniques] could be used even though not explicitly stated?"	R1-R3: Lack of consensus with selection of Aspect V categories to describe interventions.

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Overall Taxonomy NA (No changes after round three as this was the last round).	Participants identified as finding the taxonomy useful for conceptualising clinical work.	R1: NA R2: "I think it is a very comprehensive taxonomy, well thought through and a useful way of looking at our work generally and more specifically for children with language impairment". R3: "...making teaching techniques explicit and separating/ coding them required much thought and checking with the reference document. This signifies the need for such a document (once the results are out) as I think we all agree language teaching techniques come across as 'vague'. Some look and sound so natural that it may not actually feel like a technique and is not recognized as such. A solid description and classification system may have fantastic implications for clinical education and parent training!"	NA
Overall Taxonomy NA (No changes after round three as this was the last round)	Participants identified that understanding and applying the taxonomy accurately takes time and consideration.	R1: NA R2: "Challenging to keep all parameters in mind. I hope I have not been too hasty in my responses." R3: "It took me quite a while to work through."	NA
Overall Taxonomy NA (No changes after round three as this was the last round)	Participants commented that the taxonomy and their understanding of the taxonomy improved over rounds and that examples assisted in improving the taxonomy.	R1: NA R2: "The changes made in this round are much better and clearer than the first." R3: NA	NA